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Basic Gas Combustion Equipment
The Direct-Reading Spectrometer
Casting Steel Mill Rolls

STEEL

The Magazine of Metalworking and Metalproducing

VOL 121, NO. 11 SEPTEMBER 15, 1947

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19 MORGAN STRIP and SKELP MILLS are promoting recovery in five countries

In the United States, England, France, Belgium and Germany Morgan mills are on the job turning out great quantities of strip and skelp at low cost . . . helping people to help themselves.

However these mills were bought for only one purpose: **To make a profit.**

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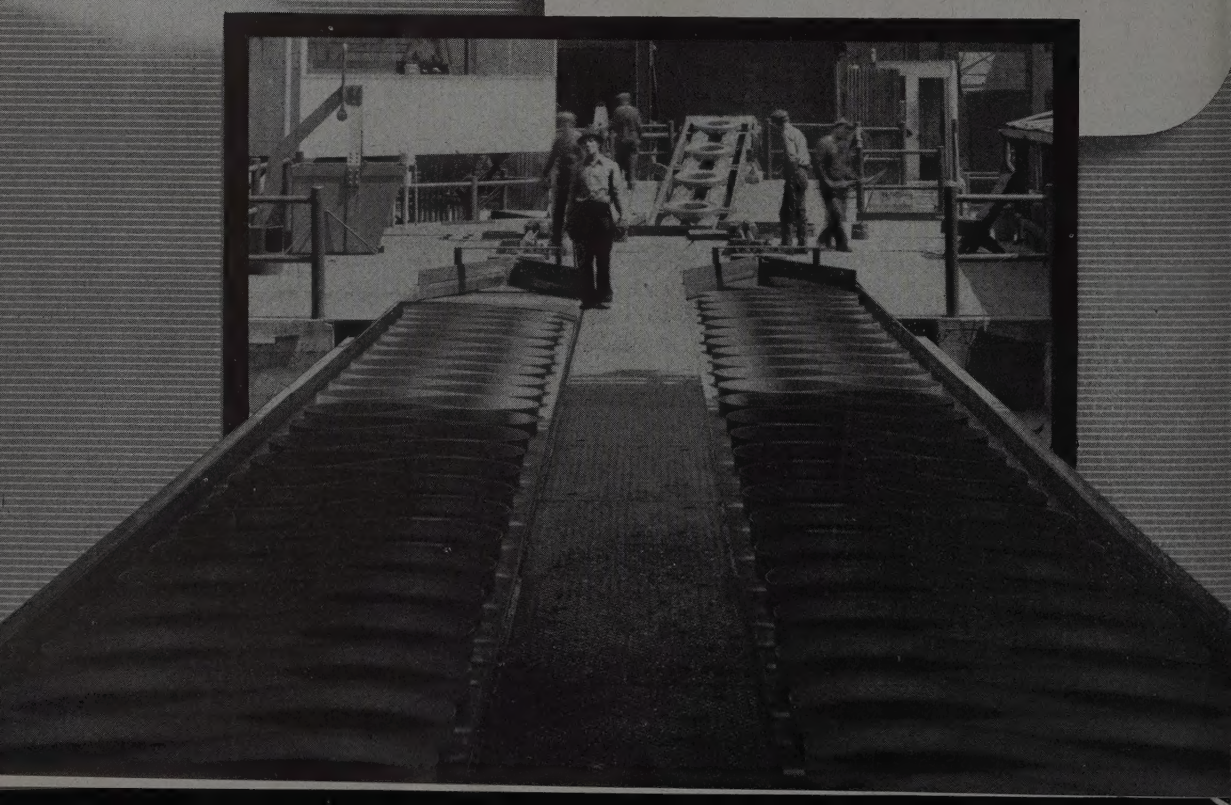

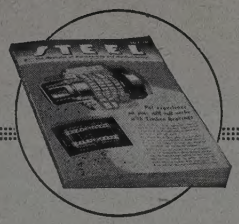

September 15, 1947

Living for Today

Representatives of Ford Motor and UAW-CIO worked hard to develop an employees' pension plan. After much give and take, they evolved a plan upon which employer and union could agree. Now it is up for vote by union members. Reports say Communists have been trying to sabotage it, but after making liberal allowances for this possibility, one is shocked by the news that employees of a Buffalo assembly plant have voted against the pension plan 406 to 32. The Buffalo workers favor a straight 11½c wage increase plus an additional 3½c per hour for six paid holidays in lieu of the security embodied in the pension plan.

This vote of more than 12 to 1 against a liberal pension plan connotes something more fundamental than any conceivable Communistic influence. It has been said that the one-sided adverse vote is explained by the fact younger workers are not interested in a plan which promises benefits 30 years in the future. They want theirs now!

To persons of mature judgment the idea of exchanging a few immediate inflated dollars for security later on in life seems ridiculous. But before condemning the youthful Buffalo employees of Ford too harshly, consider the environment in which they have been raised.

If they are in their twenties, most of their adult lives has been lived under New Deal propaganda, which ridiculed thrift, promised something for nothing and encouraged people to live for the day and to forget tomorrow.

During most of their adult lives they have seen their own government and virtually all other governments incur expenses that could not possibly be met by current income but which must be levied against future generations yet unborn.

Since V-J Day they have seen their government sanction and practically force wage increases that could not be paid out of the results of past performances but must be repaid by efficiencies to be developed sometime in the future. They have seen every element of society temporize by evading current problems and leaving their difficult solution to a hoped-for providential future.

Perhaps the Buffalo Ford workers are not as deserving of censure as we may think at first glance. Possibly their attitude is all too indicative of a malady that afflicts the entire world. Too few of us have the courage to face realities. Too many of us are living for today, forgetful of tomorrow and shamefully callous about the mess we are handing on to our children and their children.

* * *

EXPENSIVE EXPEDIENTS: Typical of the lengths to which steel consumers will go to get steel is the situation prevalent in the automobile industry. Most motor car builders earmark a large proportion of their production scrap for shipment to the furnaces of their steel suppliers. It has been estimated that perhaps as much as 80 per cent of the scrap generated in the automobile industry is channeled to specific steel producers.

This means that the volume of "free" automobile scrap available for purchase on a competitive bid basis by scrap dealers and brokers has dwindled to insignificant proportions. Under present conditions, the market price can be set by the highest bidder on the very small tonnage of free scrap that is offered.

Another abnormal practice affecting the scrap market is the "conversion" deal. A consumer needing steel badly arranges with an electric furnace melter to make ingots from scrap which the melter or the consumer buys in the open market. The ingots go to a mill having open rolling capacity and

(OVER)

are reduced to sheet bars or to sheet and strip. Here the thinness of the market contributes to high prices for scrap.

These practices make for unnecessary cross hauling, fantastic prices and a badly distorted scrap market. One wonders if some of the zeal to get steel or scrap isn't defeating its own purpose. The waste is terrific. —p. 64

* * *

BEHIND THE CURTAIN: In current Washington discussions on American steel capacity much will be said concerning the necessity of implementing the Marshall Plan with exports of steel from the United States to help rehabilitate industries abroad. It may be decided that we must export a substantial tonnage even if it entails hardships at home.

The American public could go along with this proposal more cheerfully if it were convinced that our foreign policy will be more realistic in the future than in the past. Since V-E Day we have seen large shipments going to Russia of the best industrial equipment we are capable of building. In view of Russia's present attitude on many world problems, we are justified in wondering whether we were wise in supplying this equipment for the sole use of Russia behind her iron curtain.

If the Marshall Plan is to work, we must be careful to see that our goods go where it will be used constructively. —p. 59

* * *

NEW MODELS ON WAY: In prewar days, September was the month in which automobile assembly lines were halted while production equipment was being changed over to accommodate new models. Today, when lines are down, it is because of shortages of materials and parts. No shift-over to new models is in progress at the moment.

However, new models are on the way. A resume of what automobile manufacturers are planning indicates that a gratifying number of changes in design are contemplated. These changes in 19 cars, running alphabetically from Buick to Willys-Overland, vary all the way from simple "face-lifting" alterations to substantial modifications in body and power plant.

Considering the present relation of demand to supply, there is little incentive to introduce marked model changes. This makes the contemplation of so many improvements especially significant. It shows that in spite of current complications, some automobile manufacturers are foresighted enough to prepare for the day when the buyer can and will compare values. —p. 75

SIGNS OF THE TIMES: Officials of Great Lakes Steel Corp. were all set to attend the formal relighting of newly lined "B" blast furnace on Zug Island, off Detroit, on the morning of Sept. 5. To the surprise of engineers and furnace crew, the stack jumped the gun by relighting itself on the evening of Sept. 4 (p. 61) and the ceremonies were called off. . . . In the biggest moving job ever performed in connection with an industrial exposition (p. 66) 3000 workmen are completing the installation of 8000 tons of machinery and equipment in the Dodge-Chicago plant and everything will be in readiness for the opening of the 1947 Machine Tool Show on Sept. 17. . . . Research has revealed that diamonds are radio-active sensitive (p. 70) and for this reason single-crystal colorless diamonds can be used as counters in exactly the same way as the man-produced Geiger-Muller counters. . . . In the week ended Sept. 13, production of passenger automobiles and trucks in the United States exceeded 100,000 (p. 75) for the first time since the week ended July 19. . . . Elimination of hand wiring in mass production of electrical circuits has been made practical by applying metallizing techniques to the spraying of electrical conductors. Wire fed into metallizing spray guns (p. 96) is converted into flat conductive strips imbedded in dielectric panels. Metal sprayed directly on a panel through apertures in a stencil forms the entire basis wiring of the chassis in a single operation. . . . Representative Hartley, co-author of the Taft-Hartley Act, told members of the Pressed Metal Institute (p. 67) that the new labor law will succeed in spite of the organized efforts to sabotage it. This prediction was made just before the time the counting of ballots in Pennsylvania's Eighth District showed that Franklin H. Lichtenwalter had been elected to Congress by an impressive majority over an opponent who campaigned against the labor bill and who had the solid backing of CIO-PAC, AFL and the railroad brotherhoods. . . . Wholesale price index of the U. S. Bureau of Labor Statistics for the week ended Aug. 30 registered 154 per cent of the 1926 average (p. 80), a gain over the 153.5 level of the previous week. This was the ninth consecutive week in which the index has moved upward. . . . If an extra session of Congress is deemed necessary (p. 68), it probably cannot convene before November.

E. L. Shaner

EDITOR-IN-CHIEF

Manufacturer Flies Ryerson Engineer to Plant . . .

and returns him with problem solved

A machinery manufacturer faced an emergency. He was changing over to flame-cut steel plate for many parts previously cast. In the process of change-over, unforseen production problems threatened to stall his entire operation. Committed to a heavy schedule of deliveries, he saw the threat of reduced volume as an inconvenience to customers—a mark against his company.

Moving swiftly against time, he called Ryerson in a neighboring state, offering to send his company plane if a Ryerson specialist would make a flying trip to his plant. We agreed, and, in a matter of hours, a Ryerson engineer was on the spot giving practical assistance.

By simplifying several parts, engineering difficulties were avoided. Standardization of other parts reduced cost and made better use of available steel. There was no slow-down in production.

As our specialist was flown back that same day, he made out a report covering his activities. It was brief enough. It read: Customer service.

That brief report—customer service—sums up the reason so many steel users make Ryerson the first source for steel from stock and turn to us in time of trouble. Despite steel shortages there is no shortage in our willingness and ability to cooperate. Our technical men will gladly work with you on any steel problem, or assist in the search for a suitable alternate when needed steel is not available.

Remember that Ryerson facilities and experience are always at your service when you call.

JOSEPH T. RYERSON & SON, INC.

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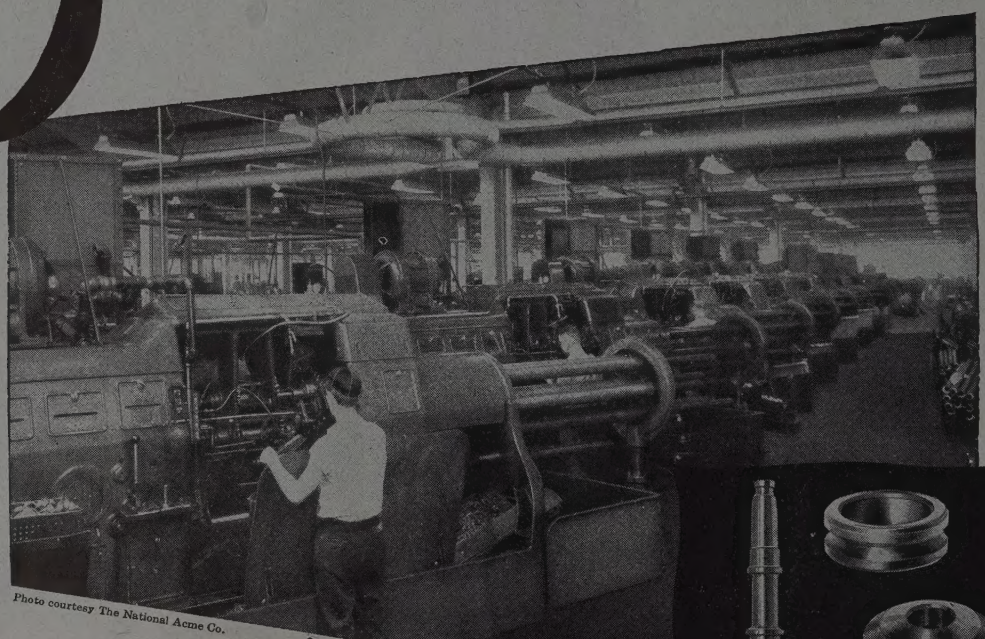

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Tune in . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Sunday night. See newspaper for time and station.

Eighty-ft crane girder, fabricated at Bethlehem Pacific's Alameda works for the company's new electric furnace plant at Los Angeles, is unloaded at the new plant site. Girder is more than 7 ft high and weighs 35 tons

STEEL
September
15
1947

Soaring Costs Hitting Steel Mill Modernization Plans

Bulk of 1947 expenditures earmarked for finishing facilities. Basic steelmaking capacity increases will be moderate. Some projects deferred due to sharp increase in construction costs

PLANNED expenditures by the steel industry for new equipment and facilities in 1947 are the largest for any recent year, and will add moderately to basic steelmaking capacity. Sharply increased construction costs, however, are a limiting factor on the amount of new facilities being installed.

Of the $448 million earmarked for expansion and modernization this year, the bulk is going for expansion of the industry's capacity for producing sheet and strip, products for which demand and scarcity have been most pronounced in the postwar period. About 25 mills for rolling hot and cold sheet and strip either are building or recently have been completed (list on page 60).

Original postwar expansion programs for sheet and strip capacity called for completion by mid-1947 of an additional 3 million tons over prewar capacity. By reason of strikes and delays in the equipment and machinery supplying industries, about 2 million tons of this was not completed on schedule but now is expected to be ready for operation by July, 1948, provided no more unusual delays are encountered. Further flat-rolling capacity is being projected for the last six months of 1948.

Substantial expenditures also are being made to adapt for peacetime operation facilities built by the government for war purposes and since acquired by private companies.

Large investments also are being made for rolling and finishing facilities for bars, rods, wire and tin plate, all of which are in high demand and short supply.

Miscellaneous facilities, including coke ovens, power plants, machine shop equipment, soaking pits, materials handling equipment, scrap preparation machinery, rolling stock for railroads, ships, coal mine development and equipment, ore mine development and equipment, ore sintering facilities, account for most of the balance.

Soaring construction costs recently have been discouraging plans for large additions to facilities, and in fact, have resulted in the deferment of some projected additions. Costs have risen so sharply that steel men now estimate that if all the projects included in the planned $448 million expenditure this year were completed, the actual cost would be well in excess of a half billion dollars.

Steel men doubt that facilities built at present costs can be operated profitably over a period of years. In some quarters, the belief is that new construction should not be undertaken unless it can "wash out" the abnormal cost within the next two years.

Effect of sharply increased costs is reflected in statements by the leading steel producers. National Steel Corp., for example, estimates postwar construction is worth only 70 per cent of what it cost and figures that 1946 additions costing $27 million are worth $19 million over the period in which they will be amortized, leaving $8 million as abnormal costs.

United States Steel Corp. says that "at June 30, 1947, the amount necessary to complete all authorized additions to and improvements of facilities was approxi-

mately $350 million. Because of the rising cost of construction, this amount includes $60 million more than was originally estimated would be required to complete the authorized additions and improvements."

American Rolling Mill Co. in its pamphlet report points out that "severe increase in costs has caused us to consider seriously holding up certain of our construction projects until a more favorable time. One such project involving a considerable expenditure has already been postponed."

Youngstown Sheet & Tube Co. has plans for expansion of facilities at Chicago which will call for "very large expenditures and the decision as to when to contract will depend upon prices of equipment and construction costs, as well as the ability to secure completion within a reasonable time."

Republic Steel Corp. points out that the current cost of construction is 2 to 3½ times the original cost of many of the company's furnaces and mills.

Companies with large long-range building programs are watching construction costs carefully and these, considered with the market picture, will determine the beginning of many new facilities.

Projected expenditures this year bring to nearly $3 billion the total amount spent by steel companies since 1935 to improve their plants. Expenditures for previous years were:

Year		Year	
1946	$291,000,000	1940	$171,000,000
1945	204,000,000	1939	121,000,000
1944	136,000,000	1938	140,000,000
1943	239,000,000	1937	320,000,000
1942	265,000,000	1936	216,000,000
1941	295,000,000	1935	140,000,000

Expansions in basic steelmaking capacity are expected to add 2.5 million tons of capacity this year and next. Among projected open hearth additions are a 175-ton furnace at Otis Works of Jones & Laughlin Steel Corp., two open hearths at Bethlehem Steel Co.'s Sparrows Point plant, and four 75-ton open hearths to be installed by Pacific States Steel Co., Niles, Calif.

First hot metal streams from the iron notch as the relined "B" furnace of Great Lakes Steel Corp. on Zug Island, Detroit, returns to production after being down only 45 days. Carbon block hearth was installed in the 1250-ton unit

Many companies desiring to increase steelmaking capacity will do so by enlarging and modernizing present furnaces rather than undertaking new construction.

Several companies are adding new electric furnace facilities. American Rolling Mill Co. broke ground in June for a $3 million plant at Middletown which will include two 70-ton electric furnaces. Allegheny Ludlum Steel Corp.'s Brackenridge, Pa., plant includes a 50-ton furnace. Sharon Steel Corp. will install an electric furnace at Lowellville Works.

Somewhat greater expansion of blast furnace capacity is being made, with 3 million tons to be added by the end of 1948. The scrap shortage being what it is, expansion of pig iron capacity is virtually a prerequisite to enlarged steelmaking capacity.

Several companies have completed or are building new stacks. Other companies are undertaking enlargements of older stacks to increase capacity and some have acquired surplus plants which included partially completed stacks which were completed by the buyers.

Henry Kaiser has proposed to build 4 open hearths and a 1200-ton blast furnace at Fontana, Calif., if the RFC agrees to scale down his debt on the war-built plant (see page 62.)

New coke ovens are being constructed

(*Please turn to Page* 168)

Rolling Mills Recently Installed or Scheduled for Early Completion

Company	Location	Type of Mill
Continuous Cold Reduction Strip Mills		
Acme Steel	Riverdale, Ill.	26" 5-Stand Tandem
American Rolling Mill	Butler, Pa.	54" 5-Stand Tandem
Bethlehem Steel	Lackawanna, N.Y.	54" 4-Stand Tandem
Bethlehem Steel	Sparrows Pt., Md.	56" 4-Stand Tandem
Carnegie-Illinois	Gary, Ind.	42" 5-Stand Tandem
Carnegie-Illinois	Gary, Ind.	42" 5-Stand Tandem
Crucible Steel	Midland, Pa.	54" 3-Stand Tandem
Great Lakes Steel	Detroit	54" 3-Stand Tandem
Steel Co. of Canada	Hamilton, Ont.	54" 5-Stand Tandem
Tennessee Coal, Iron	Fairfield, Ala.	54" 4-Stand Tandem
Weirton Steel	Weirton, W. Va.	42" 5-Stand Tandem
Allegheny Ludlum	W. Leechburg, Pa.	28" 4-Stand Tandem
Carnegie-Illinois	Gary, Ind.	54" 4-Stand Tandem
Columbia Steel	Pittsburg, Calif.	56" 5-Stand Tandem
Columbia Steel	Pittsburg, Calif.	3-St'd. Tandem
Great Lakes Steel	Detroit	93" 3-Stand Tandem
Inland Steel	Indiana Harbor, Ind.	42" 5-Stand Tandem
Jones & Laughlin	Aliquippa, Pa.	42" 5-Stand Tandem
Granite City	Granite City, Ill.	56" 4-Stand Tandem
Hot Strip Mills		
Bethlehem Steel	Sparrows Pt., Md.	68" Cont. Hot Strip
Crucible Steel	Midland, Pa.	Rev. Hot Strip
Geneva Steel	Geneva, Utah	2 Stand Addition
Inland Steel	East Chicago, Ind.	76" Hot Strip, 1 Drive
Republic Steel	Youngstown	48" Hot Strip
Tennessee Coal, Iron	Fairfield, Ala.	2 Stand Addition
Skin or Temper Pass Mills		
Bethlehem Steel	Sparrows Pt., Md.	56" Temper Mill (Coils)
Bethlehem Steel	Sparrows Pt., Md.	56" Temper Mill (Sheets)
Bethlehem Steel	Sparrows Pt., Md.	2 Stand Temper Mill
Bethlehem Steel	Sparrows Pt., Md.	32" Temper Mill
Bethlehem Steel	Sparrows Pt., Md.	2 Stand Temper Mill
Columbia Steel	Pittsburg, Calif.	42" Temper Mill
Columbia Steel	Pittsburg, Calif.	60" Temper Mill
Inland Steel	Indiana Harbor, Ind.	72" Temper Mill
Inland Steel	Indiana Harbor, Ind.	54" Temper Mill
Weirton Steel	Weirton, W. Va.	54" Temper Mill
Bar and Rod Mills (Continuous)		
Bethlehem Steel	Lackawanna, N.Y.	10" Bar Mill
Bethlehem Steel	Los Angeles	12" Merchant Bar
Copperweld Steel	Warren, O.	9" Bar Mill
Copperweld Steel	Warren, O.	12" Bar Mill
Crucible Steel	Midland, Pa.	24" 6 Stand Billet Mill
Crucible Steel	Midland, Pa.	Rod Mill
Laclede Steel	Alton, Ill.	10" Morgan Rod Mill
Latrobe Elec. Steel	Latrobe, Pa.	Bar Mill
National Tube	Lorain, O.	20" Continuous Billet
National Tube	Lorain, O.	26" Continuous Billet
Sheffield Steel	Kansas City, Mo.	Morgan Rod Mill
Reversing Blooming, Bar and Billet Mills		
A. M. Byers	Economy, Pa.	26" Blooming Mill
Bethlehem Steel	Los Angeles	32" Blooming Mill
National Tube	Lorain, O.	46" Blooming Mill
National Tube	Lorain, O.	35" Bar Mill
Wheeling Steel	Wheeling, W. Va.	36" Blooming Mill

Relined Blast Furnace Jumps Gun

Great Lakes "B" stack relights self day ahead of schedule to surprise engineers and crew and cancel planned ceremonies. Relining and repair job completed in 45 days

DETROIT

SCHEDULED for formal relighting the morning of Sept. 5, the newly relined "B" blast furnace of Great Lakes Steel Corp. on Zug Island, off Detroit, surprised engineers and furnace crews by "relighting itself" the evening before, thereby forcing cancellation of the planned ceremonies.

The 1250-ton furnace had been in operation continuously since Dec. 9, 1941, and was blown out for relining on July 23 last, after producing a total of 2,406,400 tons of iron in five years and 8½ months. During this period the high monthly total was in May, 1943, when output totaled 49,704 tons, a new record for a furnace of this size at that time.

Explanation for the premature starting, an unusual occurrence in blast furnace operation, probably lies in the fact that stoves were heated by burning blast furnace gas from two other furnaces at the plant, beginning Aug. 30, the heated air being applied to the new furnace by a light blast at around 700°F beginning Sept. 1 and continuing with some interruption until charging on Sept. 4. This was done to dry out the new lining.

Wood ties had been laid on the hearth to protect a length of pipe which had been inserted through the tap hole to accommodate the lighting torch. Over them were placed several hundred bags of charcoal and on top of that several feet of coke to tuyere level. Then came the normal charges of ore, coke and limestone. It is reasoned by the blast furnace superintendent that sufficient heat was retained in the carbon hearth from the preheating to kindle the ties and in turn ignite the charcoal and coke.

First indication was the appearance of sparks flying out the tap hole at about 11:30 o'clock on the evening preceding the formal scheduled lighting. Then flame was noticed through one of the tuyeres, so instructions were issued to turn on the wind, and the furnace was off!

Relining of the stack and repairs to auxiliaries were accomplished in 45 days instead of the customary 90 days required for such a job, and it is calculated this fast time will mean a 45,000-ton gain in pig iron production. Much of the time saving resulted from the success of a new method of cleaning out the furnace when it went out of blast. A large hole was cut into the foundation brickwork near ground level and then a smaller hole drilled and burned through to the center to a point estimated to be the base of the salamander. Calculations proved correct and the 480 tons of molten iron in the salamander was drained off to nearby pits which had been previously excavated for the purpose. It required about 7 hours for this drainage and the solidified iron later was broken up for recharging. Upper brickwork in the old lining was removed by blasting. When the shell was cleaned, on Aug. 11, two shifts of bricklayers, working ten hours each, went to work on rebricking.

Hearth is of a new type, comprising carbon block laid up with carbonaceous cement and packing. The block material weighed 445,200 lb, and the packing 84,800 lb. Over this block hearth was laid a 6-in. course of firebrick which will be quickly consumed once the furnace is in regular operation. Carbon was installed by A. E. Anderson Construction Corp., assisted by Arthur G. McKee & Co., which company installed all of the rigging to handle the blocks and place the material inside the furnaces.

Drilling and burning for the salamander were handled by the Chicago Concrete Breaking Co., assisted by Great Lakes Steel Corp. employees who also prepared the sand beds. All piping, electrical work and repairs to other furnace auxiliaries during the relining were handled by Great Lakes employees. On an average, about 200 men per day were employed on the job, and the interesting feature was that both AFL and CIO union members worked continuously together at top speed and with no friction between unions. J. A. Clauss, vice president in charge of engineering, directed the overall relining job.

Present, Past and Pending

■ J&L SEEKS CLEVELAND SITE FOR EXPANSION

CLEVELAND—Jones & Laughlin Steel Corp. has filed application with the city of Cleveland to trade one acre of land on the Cuyahoga river for a tract of equal size owned by the city to make possible a proposed $13 million modernization program for its 77-in. strip mill.

■ ANACONDA PLANS $20 MILLION MINING PROJECT

NEW YORK—Anaconda Copper Mining Co. will spend more than $20 million in the next five years on a new project to mine hitherto unprofitable low-grade copper ore in Montana.

■ FORD MOTOR CO. BUYS FORGING PLANT IN OHIO

DEARBORN, MICH.—Ford Motor Co. has purchased for $950,000 a Canton, O., gun forging plant operated during the war by Republic Steel Corp. After refitting, the plant will supply forgings for passenger cars, trucks and tractors.

■ CLEVELAND BOMBER PLANT SOON MAY BE VACATED

CLEVELAND—Consumer demand for surplus war goods is expected to empty by Jan. 1 the government's vast bomber plant here, now a WAA storage. Operated during the war by the Fisher Body Division of General Motors Corp., the plant is being sought by the city of Cleveland to supplement facilities of the adjacent Cleveland airport.

■ ENGINE OF NEW EFFICIENCY ANNOUNCED

MT. VERNON, O.—Cooper-Bessemer Corp. has announced a new development in two-cycle gas engines permitting a 10 per cent increase in horsepower with 15 per cent less fuel consumption. The new engine, which will be in full production by the second quarter of 1948, is of the type used in gas line pumping stations.

■ AVCO MAY ACQUIRE ADDITIONAL PROPERTIES

NEW YORK—Avco Mfg. Corp. may acquire a substantial interest in a new corporation consisting of non-aviation properties of Consolidated Vultee Aircraft Corp.

■ SCRAP IMPORTS NOT TO BE PROHIBITED

WASHINGTON—Importation of scrap metals after Oct. 1 will not be prohibited, according to Maj. Gen. Donald H. Connolly, foreign liquidation commissioner. FLC regulation 8 has been amended to permit continuation of such imports.

Rail Strike Ties Up Carnegie Mills

Wildcat walkout causes loss of 16,000 tons finished steel daily, forces unemployment of 17,000 steelworkers

PITTSBURGH

DAILY loss of 16,000 tons of critically needed finished steel and enforced idleness of 17,000 steel workers and threatened unemployment of many thousands more were direct results last week of a wildcat strike of 1800 operating employees of the Union Railroad, subsidiary of the United States Steel Corp., serving the Carnegie-Illinois Steel Corp. plants in the Pittsburgh district.

Strike forced almost complete cessation of coke, blast furnace, open hearth and finished steel production schedules at Carnegie's plants here, causing a daily loss of 21,000 tons of ingots, 15,000 tons of pig iron. The finished steel lost daily would be equivalent to the amount needed for the manufacture of more than 8000 automobiles.

The corporation's Clairton coke plant was kept operating at 31 per cent capacity, lowest possible level at which the ovens can be maintained without serious damage to refractory linings.

The equivalent of 20 to 24 blast furnaces was banked. Only six of 108 open hearths remained in operation.

Finishing mill production schedules were stopped on all items produced here except sheet, strip and tin plate. By midweek, the 80-in. hot mill at the Irvin Works was forced down.

Strike prevented the shipment of sheets and tin plate, resulting in most tonnage produced, except that shipped by truck, going into stock.

Nearly complete stoppage of steel ingot output at Carnegie's plants forced a drop of 47 points in Pittsburgh district steel rate last week to 51.5 per cent and was the chief factor in the decline of the national rate.

Stoppage did not involve operations at Carnegie's Vandergrift sheet plant, nor those at American Steel & Wire Co. or National Tube Co. here.

However it was expected to result in an early and sharp cutback in operating schedules of nonintegrated steel producers and many metalworking plants relying on Carnegie for semifinished and finished steel products. An estimated 70 per cent of Allegheny Ludlum Steel Corp.'s employees in the Brackenridge and West Leechburg plants, affecting 5000 workers, will be furloughed early this week if the strike is not settled. Follansbee Steel, dependent on Carnegie for pig iron and sheet coils, was scheduled to start furloughing employees over the week end.

A survey made by the Tristate Industrial Association indicated most metalworking companies would be able to maintain near normal production schedules through this week. However, this would deplete their steel inventories.

Carnegie officials estimate five days will be required after the strike settlement to bring pig iron production back to normal and an additional four days to resume normal ingot output.

August Steel Output Rises 400,000 Tons Above July

Production of 55,843,104 net tons of steel ingots and castings in the first eight months of 1947 exceeded the output of 52,798,714 net tons for the entire year of 1939, the American Iron & Steel Institute reported last week.

Furthermore, production in the first eight months of 1947 exceeded by almost 15 million tons the 40,877,126 net tons produced in the corresponding period of last year.

August steel operations, averaging 90.2 per cent of capacity, resulted in production of 6,989,297 net tons of steel, more than 400,000 tons above the 6,570,154 tons produced in July and slightly above the 6,924,522 tons of August, 1946.

Work Interruptions Reduce Finished Steel Shipments

Effects of a holiday, vacations and a coal miners' strike are reflected in a decline in finished steel shipments in July to 4,974,566 net tons from the 5,263,711 net tons of June, according to the American Iron & Steel Institute.

The July shipments bring total net shipments of all grades of finished steel, including alloy and stainless, to 36,165,380 net tons for the first seven months of 1947. In all of 1946, shipments amounted to 48,775,532 net tons.

Although tonnage of sheets moved in July was below that of June, the July sheet tonnage constituted a slightly greater percentage of total shipments than was the case in June. Hot-rolled sheets shipped in July totaled 561,023 net tons, cold-rolled sheets 441,294, and galvanized 131,373. July shipments of strip were off slightly in tonnage and percentage of total steel shipments, compared with June. In July, movement of hot-rolled strip involved 131,446 net tons and cold-rolled strip 115,878 net tons.

Kaiser Proposes To Double Capacity of Fontana Plant

Proposal to double the steelmaking capacity of the Fontana, Calif., steel plant, provided the Reconstruction Finance Corp. will accept a new plan to scale down the debt on the mill, was made last week by Henry J. Kaiser.

Under the new proposal, Kaiser asks the RFC to write off $34,510,000 from the present debt on the Fontana plant. In return, he proposes to raise $80 million by private financing to pay for the proposed expansion and provide additional working capital.

Kaiser said $15 million of the new funds would be applied to the existing debt of about $105 million, reducing the debt to $90 million. He suggested the RFC then scale this down to $55,400,000.

If the RFC agrees to write-down, Kaiser says he will go ahead with an expansion program that will increase Fontana ingot capacity from 780,000 tons to 1,300,000 tons and increase capacity to produce steel shapes from 565,000 to 931,000 tons.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								*Calculated weekly	
	—Open Hearth—		—Bessemer—		—Electric—		—Total—		production all	Number of
1947	*Net tons	Per cent of capac.	Net tons	Per cent of capac.	*Net tons	Per cent of capac.	*Net tons	Per cent of capac.	companies Net tons	weeks in mo.
Jan.	6,544,841	95.1	384,096	87.7	284,309	65.9	7,213,246	93.0	1,628,272	4.43
Feb.	5,830,371	93.8	314,912	79.6	276,779	71.1	6,422,062	91.7	1,605,515	4.00
Mar.	6,614,369	96.1	378,893	86.5	314,224	72.9	7,307,486	94.3	1,649,545	4.43
1st qtr..	18,989,581	95.0	1,077,901	84.8	875,312	69.9	20,942,794	93.1	1,628,522	12.86
Apr.	6,360,600	95.4	375,675	88.6	306,422	73.4	7,042,697	93.8	1,641,654	4.29
May	6,634,716	96.4	372,878	85.2	321,903	74.6	7,329,497	94.5	1,654,514	4.43
June	6,312,674	94.7	351,247	82.8	304,744	73.0	6,968,665	92.8	1,624,397	4.29
2nd qtr..	19,307,990	95.5	1,099,800	85.5	933,069	73.7	21,340,859	93.7	1,640,343	13.01
1st 6 mos. .	38,297,571	95.3	2,177,701	85.2	1,808,381	71.8	42,283,653	93.4	1,634,467	25.87
†July ...	6,028 707	87.8	256,125	58.6	285,322	66.3	6,570,154	84.9	1,486,460	4.42
‡Aug. ...	6,329,796	92.0	346,033	79.0	313,468	72.7	6,989,297	90.2	1,577,719	4.43

† Revised. ‡Preliminary figures subject to revision.

For 1947, percentages of capacity operated are calculated on weekly capacities of 1,553,721 net tons open hearth, 98,849 net tons bessemer and 97,358 net tons electric ingots and steel for castings, total 1,749,928 net tons; based on annual capacities as of Jan. 1, 1947, as follows: Open hearth 81,010,990 net tons, bessemer 5,154,000 net tons, electric 5,076,240 net tons, total 91,241,230 net tons.

Ford Employees at Buffalo Vote Down Proposed Plan for Pensions

Poll favors hourly across-the-board wage increase and additional holiday pay 406 to 32. Assembly plant results seen pointing to likely whacking defeat of pension plan in secret poll of Rouge plant workers Sept. 14

IF RESULTS of the first voting on the Ford Motor Co. employee pension plan are any gage of the final result, the proposal was due for a whacking defeat in the secret ballot among UAW-CIO members of the Rouge plant Sunday, Sept. 14, in Detroit. Employees of a Buffalo Ford assembly plant voted against the pension plan 406 to 32, favoring a straight 11½c across-the-board increase plus an additional 3½c per hour for six paid holidays—the same pattern applying to most of the auto industry.

Explanation of the one-sided adverse vote probably lies in the fact younger workers are not particularly keen about subscribing to a plan which produces no benefits until they have accumulated 30 or more years of service and which would cost them 2½ per cent of their annual earnings. They would rather have the full 15 cents per hour increase now and worry about the future at some later date.

Nevertheless leaders of UAW-CIO local 600 at the Rouge plant have been carrying on an intensive campaign to persuade their members to approve the pension plan, developed only after months of investigation and negotiation. They cite figures on ages of Ford employees, claiming 41.5 per cent are now over 50 years of age, with 8000 old enough to retire at the end of this year, 33,000 in ten years, and 50,000 in 15 years. The breakdown of age groups among 63,248 employees is interesting to analyze and is as follows:

Age	Number
15-19	388
20-24	2977
25-29	6517
30-34	6988
35-39	6377
40-44	6227
45-49	7520
50-54	8853 (top)
55-59	8103
60-64	5664
65-69	2515
70-74	868
75-79	199
80 and over	52

As examples of what the pension plan would provide for both young and old employees, the following are typical: A man age 28 with one year of service and now earning $1.33 per hour would receive upon retirement at age 65 and with 38 years of service a company pension of $82.94 per month, plus social security of $54.51 or a total of $137.45.

At the other end of the age scale, a man age 64 with 34 years of service and earning currently $1.33 per hour (highly unlikely to be this low) could retire in two years and receive company pension of $54.49, plus social security of $44.24, or a total of $98.73 monthly.

Company contributions to the proposed plan are calculated by union statisticians to be $12 million annually over the cost of the 15-cent wage increase pattern. All contributions, from employees and company, are to be placed in the hands of a third party, either a trust company or an insurance company, and no part of the fund may be used for any purpose other than to provide benefits under the plan, except that portions may be invested in securities approved by the laws of Michigan and New York.

The plan is designed to be administered jointly by a three-man committee comprising two representatives from the company and one from the union. A majority vote of this group is required for all decisions, except that if the union representative disagrees with the company members the issue will be handed to a referee for final determination.

Employees are under no compulsion to subscribe to the pension plan and they may withdraw all contributions plus interest should they sever connections with the company.

In its strenuous efforts to sell the pension plan to younger employees, the UAW-CIO has stressed the angle of job security, pointing out that the retirement plan will mean the departure of men over 65 with reasonable monthly income, to make way for younger employees. Still, according to the figures just listed, men 65 and over currently number only 3634, or less than 6 per cent of the total. Any future seasonal layoffs due to slumping automobile production will affect far more than 6 per cent of Ford employees.

A provision in the Ford union contract covering the pension plan provides that it may be terminated by the company after two years, or the term of the contract. However, as the UAW-CIO points out, the plan must be approved by the Bureau of Internal Revenue, since tax deductions are allowed for all contributions the company makes to the fund. Once approved as a sound plan and placed in effect, the fund could not readily be discontinued except with the danger of heavy penalties for retroactive tax payments and possible fines.

The UAW-CIO retained Martin Segal, an "expert" on pension plans, whose opinion includes the following three notations: (1) The benefit structure is above average and accomplishes the benefits which the union set out to obtain; (2) the "fringe" issues connected with the plan, like eligibility, vested rights, retirement date, etc., range from average to above average; and (3) the period of agreement and the funding are not good, unless the union remains strong enough to maintain the pension plan in renewable collective bargaining agreement.

If tabulation of Sunday's voting shows the Ford pension plan to have been defeated—and last week things seemed to be pointing that way—it is by no means a dead issue. The majority may have figured it more advantageous to take the 15-cent hourly increase now and then bring the pension plan up again next year as an economic issue. If the plan could be pushed through a year hence, workers literally would "have their cake and eat it too."

Bearing on the subject was the request from Walter Reuther, UAW-CIO president, last week for General Motors Corp. to initiate discussions of a pension or retirement plan for GM union members. It may well be the UAW has decided to make retirement plans an industry-wide issue for next year, instead of asking for the usual round of wage increases. Their chances of success would be stronger by taking this tack.

Acme Steel To Hold Open House on Sept. 30-Oct. 1

Acme Steel Co., Chicago, has announced plans for an open house at its Riverdale plant Sept. 30 and Oct. 1. Plans have been made to permit 30,000 visitors to inspect the company's rolling mills and its finishing operations during the two days. Displays of customers' finished goods made of Acme products will be featured at the open house, some 5000 sq ft of floor space being set aside for this purpose.

National Carbon Buys Plant in Tennessee for $1,637,000

National Carbon Co. Inc., New York, has purchased for $1,637,000 the surplus carbon electrode plant that it operated during the war in Columbia, Tenn., War Assets Administration has announced.

Covering a 21-acre tract, the facility consists of eight buildings.

Scrap Trade Pinched by Mill Deals

Market distorted from normal with tonnage available to dealers and brokers limited through earmarking of production scrap for direct shipment to steelmakers

WAA BOARD OF STRATEGY: Chicago regional office of the War Assets Administration recently has undergone a reallocation of top management responsibility aimed at selling $170 million in surplus property over the remainder of the year. Shown above is the board of strategy charged with speeding disposal of surplus. Left to right: H. H. Carroll, deputy regional director for personnel and office services; J. P. Connery, deputy regional director for acquisitions; Bruce J. Brown, regional director; J. C. Apsley, acting associate regional director; R. W. Chicoine, acting deputy regional director for general disposal; E. J. Mahoney Jr., acting deputy regional director for stock control

DETROIT

PRESSURE from the automotive industry for more sheet and strip steel is the principal explanation for a scrap market which in recent months, from the standpoint of both price and supply, has been distorted beyond recognition, not only in Detroit but in other industrial areas as well. The facts of the situation boil down to about this:

To obtain specified amounts of finished steel from their established mill sources, principal automobile manufacturers have been earmarking their production scrap for return to the steelmakers. As a result perhaps 80 per cent of all scrap generated in the automotive industry is channeled to specific mills, no matter where they might be located. Credit allowed for such material, it is reported, has been figured at $20 per ton over the former OPA price ceiling on heavy melting steel, until recently when mills, reportedly cut this to $17 over the old ceiling.

Free Scrap Limited

Obviously this means the amount of "free" automotive scrap available for purchase on a competitive bid basis by scrap dealers and brokers has dwindled to insignificant proportions and has led to a scramble among buyers for what little free material there is. Thus, undue pressure has been exerted on price, all the while the earmarked scrap has held fairly stable. Formerly there were long lists of heavy tonnages of all kinds of production scrap released monthly by motor companies for bidding, which served to establish a reasonable market. Now there are no such lists, and the market often is set by the highest bidder on the small tonnage of free scrap appearing.

On top of this incongruous situation are "conversion" deals. Automobile plants not holding a favorable position in 1941 on the books of steelmakers have found it difficult to buy steel from these mills which have tried to allocate their tonnage on the basis of customer shipments in 1941. Plants which bought steel from smaller hand mills producing sheet and strip have found them taken over by large fabricators seeking to establish a steel source. Not knowing where to turn, and being none too familiar anyway with the techniques of steelmaking and distribution, automotive steel buyers in a number of cases have found an "out" in contracting with electric furnace melters to make ingots from scrap which either they or the automobile manufacturer would buy on the open market. Then the ingots are shipped to some mill which has open rolling capacity, for processing into sheet bar or directly into hot-rolled and cold-rolled sheet and strip.

Here again the thinness of the free market for scrap has forced the "conversion" buyers to travel far afield, often to the South or Southwest. Where tonnage was located, it often brought high prices—$40 to $50 a ton—whether purchased by the automobile manufacturer or by the electric furnace melter. The former was at a disadvantage in not being experienced in judging scrap on the basis of price and quality, or in relying on scrap dealers not being too seriously concerned with buying good material at a fair price; and the latter did not care much what price was involved, since the charge merely was passed along to the buyer of the ingots, plus whatever conversion charge was involved, perhaps $20 a ton or more. The advantage in the mill buying the scrap is that the material can be judged more expertly for quality, and there is less chance of rejection. For example, the instance is reported of an automobile plant buying No. 2 steel scrap in Louisiana for $47.50 per ton, and then finding 77 cars rejected by the electric furnace plant which was converting it to ingot.

In another of the conversion arrangements, an auto producer invested a reported $40,000 in equipment—cranes, charging machine, ingot molds, etc.—for an electric furnace melter to start up an idle furnace to produce rimmed steel ingots.

If auto plants had only their own requirements to consider it would not be so bad, but they are continually being approached by suppliers unable to ship because they have no steel. The only solution is for the automobile manufacturer to get steel for them somewhere. Ford, for example, has been forced to come to the aid of dozens of suppliers with steel from the Rouge rolling mill, not to mention pig iron, coke and what-not. To complicate matters, Ford has been an active buyer of scrap despite the fact the company can feed back all its own production scrap to its open hearths and electric furnaces.

It used to be an axiom around Detroit that when Ford production got to 4000 cars and trucks a day, he was a "plus" factor in the scrap market; that is, he would be generating more scrap than was being melted and thus have tonnage for sale in the open market. That day is no more. Although Ford assemblies have not figured to 4000 daily with any regularity, in terms of poundage, and including replacement parts,

output is well beyond the prewar equivalent of 4000 units; nevertheless Ford is still actively buying scrap. A delicate point is involved here. Ford, being both a steel producer and steel buyer, cannot step into the scrap market and pay a premium price for material since this might adversely affect relations with steel mill suppliers who are also vitally concerned over scrap.

As may well be imagined, the costs involved in conversion of scrap to ingots to sheet are terrific. Often an appalling amount of cross-hauling is involved, adding on to the freight bill. In addition there is the danger of off-quality material, possibly because of poor scrap, some defection in electric furnace melting, or the rolling mill experiencing difficulty because it was handling ingots from another plant. In terms of price, the sheet and strip obtained from these hop-skip-and-jump practices could easily be two or three times the present mill figure.

On the face of it, direct shipment of scrap to the steel mills is driving prices in the free market up, and is a cause for scrap being shipped long distances and into areas where it would never go in normal times.

At the moment it is reported there is building up in the minds of automobile company purchasing departments a growing resentment against the practice of earmarking their scrap. They are beginning to feel they would receive no less steel tonnage if their scrap were sold on the open market. Leading scrap dealers and brokers are positive restoration of a free market would mean lower prices and no serious scrap shortage.

More Army Scrap Likely to Come Out in Fiscal 1948

Total sales of ferrous scrap by the Army aggregated 437,833 gross tons during fiscal year ended June 30, 1947. On the basis of current plans, fiscal 1948 tonnage should be larger, including at least 500,000 gross tons of demilitarized ammunition and other scrap originating in the continental United States and approximately 300,000 tons generated in Germany. This latter scrap comprises 147,308 already sold to the Canterbury Corp., organized under the laws of Delaware, for shipment to the United States, and an additional 150,000 tons to become available by June 30, 1948.

Shipments have been resumed under the contract with the Canterbury Corp. Under the revised arrangement, enough scrap will be released at this time for the first cargo, and after that cargo has left Genoa for the United States further tonnage will be released until all 147,308 tons have been shipped.

FTC Gives Steel Industry Until Oct. 8 To File Answer To Charges

Original 20-day limit stipulated by Federal Trade Commission cancelled to permit steel producers more time in which to prepare their reply to price-fixing complaint. Sept. 19 hearing date also cancelled

INSTEAD of the 20 days stipulated in its complaint of Aug. 18, the Federal Trade Commission has set Oct. 8 as the final date by which the steel industry must file answers to the commission's charge that the industry is engaged in a "wrongful and unlawful combination and conspiracy to fix and maintain identical delivered price quotations and to restrain and destroy competition in the sale of iron and steel products."

The postponement was granted when respondents said they needed more time.

The Sept. 19 hearing date also has been cancelled for the same reason, and a new hearing date will be announced later.

The new steel case is being directed by Everette MacIntyre, the commission's assistant chief trial counsel in charge of Clayton Act cases, and the assignment for trial of the case has been handed to Lynn Paulson, one of Mr. MacIntyre's assistants.

In view of the new proceeding involving all the steel producing industry, there is some speculation in Washington as to the effect on the commission's action against the United States Steel Corp. for complete abandonment of the steel price basing point system.

It had been expected the Steel corporation attorneys would ask the Philadelphia District Court for an October date for the start of arguments in the case. It now is thought likely the Steel corporation will wish to postpone further action in its own case to see what happens in the new case involving the industry. In the meantime, Federal Trade Commission and Steel corporation attorneys are dickering as to how the costs of printing the record in the basing point case shall be shared.

Senate Group Resumes Steel Capacity Hearing

Adequacy of steelmaking capacity to support full employment will be investigated further by the Martin subcommittee of the Senate Small Business Committee which resumed sessions last Thursday following a recess of several weeks.

Thursday was devoted to hearing testimony by Otis Brubaker, economist for the United Steelworkers, who advocated increased steel capacity.

Brubaker proposed that legislation to encourage steel expansion through government aid in the form of long-term, low-interest loans by the Reconstruction Finance Corp. or a "guaranteed market plan of some sort" should be introduced early in the next session of Congress.

If this aid isn't enough to encourage adequate expansion, the union official said, "there is no alternative except for the government itself to build and lease the necessary facilities."

Brubaker asked the committee to begin an investigation on the following points:

1. The steel industry's position on production.
2. Export needs in the light of the Marshall plan and the present world role of the United States.
3. Expansion goals and methods.
4. The need for a meeting of industry, labor and government to be called by President Truman to draw up a joint program for expansion.

The union official warned that utilization of only two-thirds of steel capacity, as foreseen by the United States Steel Corp. in its 1946 report, would mean mass unemployment and depression.

Appear Before Subcommittee

On Friday, top management representatives of the larger steel companies were scheduled to appear before the committee to hear Sen. Edward Martin (Rep., Pa.), committee chairman, outline the problems of maldistribution of steel uncovered by the committee's investigation. The steel producers will be asked to express their views on possible corrections for the problems.

Among steel men invited to appear are: B. F. Fairless, United States Steel Corp.; E. G. Grace, Bethlehem Steel Corp.; T. M. Girdler, Republic Steel Corp.; Ben Moreell, Jones & Laughlin Steel Corp.; Frank Purnell, Youngstown Sheet & Tube Co.; Wilfred Sykes, Inland Steel Co.; E. T. Weir, National Steel Corp.; Charles R. Hook, American Rolling Mill Co.; Henry A. Roemer, Sharon Steel Corp.; A. J. McFarland, Wheeling Steel Corp.; and Hiland G. Batcheller, Allegheny Ludlum Steel Corp.

Tool Show Opening Is Focal Point of Metalworking Trades

First industry-wide exposition in 12 years expected to attract 100,000 representatives of all phases of production and management. Show to culminate many months of preparation by machine tool builders

FOR THE NEXT two weeks the world's largest machine shop, with machinery valued at more than $16 million, will be in operation in Chicago. When the doors of the Dodge-Chicago (Tucker Corp.) plant open Wednesday, Sept. 17, on the 2021 machine tools which comprise the show, the latest models of the machines which make the machines which power our industrial economy will be on display.

This show, held for the first time in 12 years, will be graphic proof of the wizardry of the machine tool building industry, which was restrained from developing new machinery during the war years in the interest of faster and faster output of the old models. When the war ended the industry went to work on designs frozen during the war in the drawing board stage, and up until only a few weeks ago was working feverishly to have its products ready for the show.

Show Statistics Given

Some of the statistics about the show defy visualization. A total of 294 American manufacturers of metalworking equipment and related products will have exhibits under one roof; these exhibits will require 550,000 sq ft of floor space; an estimated 100,000 executives and production men and their representatives are expected to attend; a force of 3000 workmen has been required to move the more than 8000 tons of machinery into place in the huge plant, and this moving job, incidentally, was the largest ever undertaken for an industrial exposition; the electrical equipment required to power the more than 5000 motors driving the displayed tools will supply enough electricity to light a city of 70,000 homes.

Immensity of the job of readying the former B-29 engine manufacturing plant for the installation of some of the huge machines which are now in place may be gaged from the fact that portions of the floor had to be torn up and underground pits dug to accommodate machines which were too large even for the plant's high ceiling. Because the show is aimed at demonstrating the machines in operation, performing the work for which they are designed under actual plant conditions, they had to be mounted in their customary manner, not set up as show pieces for the casual inspection of tourists.

Visitors to the show and the attendant Machine Tool Congress are expected from every section of the United States and from Canada and from at least 30 of the world's most highly industrialized nations. Handling the influx of representatives of all types of manufacturing firms in this country and from overseas as well as formal government groups will tax the hotel capacity of Chicago to its utmost, and the National Machine Tool Builders' Association, the show's sponsor, has turned over to its Chicago Committee the job of arranging for the housing and reception of visitors. This committee, incidentally, has chartered two lake steamers for the duration of the show to augment available hotel space.

Members of the Chicago Committee, headed by Rudolph W. Glasner, president, Clearing Machine Corp., include the following: George Habicht, committee vice chairman and president, Marshall & Huschart Machinery Co.; Edward K. Welles, president, Charles H. Besley & Co.; A. G. Bryant, vice president, Cleereman Machine Tool Co.; Harold B. Smith, president, Illinois Tool Works; Norton A. Booz, president, Federal Machinery Sales Co.; M. J. Wiora, Bryant Machinery & Engineering Co.; and E. Porter Essley, vice president, E. L. Essley Machinery Co.

The Chicago region, which ranks high in production of machine tools, will play an important role in providing the exhibits comprising the show. A total of 58 Illinois metalworking and related equipment producers will have their products on display, and of this total 39 exhibitors are located within Chicago proper.

INDEPENDENT GROUP HOLDS TOOL SHOW

An independent group of machine tool builders is sponsoring a Production & Machine Tool Show in the International Amphitheatre, 42nd and Halstead Sts., Chicago, Sept. 17-26, with show hours 10 a.m. to 9:30 p.m. daily.

This show will be held on the same days the National Machine Tool Show will be held at the Dodge-Chicago plant, 7401 S. Cicero Ave., Chicago.

Nearly All Surplus Tools Now Eligible for Discount

The 17½ per cent discount to dealers in surplus machine tools has been extended by War Assets Administration to include virtually all machine tools and general industrial equipment on which commissions of 12½ per cent formerly were paid.

The discount formerly applied only to machine tools which were sold at prices lower than those established by the Clayton Formula. As a result of WAA's action, nearly all tools still priced on the Clayton Formula become eligible for the discount.

The new ruling became effective on Sept. 2.

Eligible purchasers at the discount are machine tool rebuilders, manufacturers, exporters, dealers and other distributors who buy for resale. Such purchasers must certify they have been actively engaged in selling production equipment and that purchases are made for resale and not for personal use.

Discounts are made to compensate dealers for handling and selling costs.

Machinability of Southern Pig Iron Undergoing Tests

Woodward Iron Co., Woodward, Ala., last week announced a sponsored project by Southern Research Institute to counteract the effect of phosphorus in southern pig iron. The institute's experimental work is aimed at improvement of the machinability of southern pig iron so that it can be used for castings machined at high cutting speeds on semi-automatic machines as used in the automotive industry.

Because the question of economic costs and freight rates enters into the future of southern iron, the experiment is expected to determine whether the iron can be used in the automotive and machine tool industries on a competitive basis with northern iron.

Lukens Steel Holds Open House at Coatesville

Lukens Steel Co., Coatesville Pa., held an open house last week to show its plants and those of its subsidiaries, By-Products Steel Corp. and Lukenweld Inc.

Purpose of the event was to demonstrate how the company's facilities, which were considerably enlarged during the war, are now being utilized for peacetime production.

Industrialists Told New Labor Law Taking Hold

Effectiveness of measure cited at Philadelphia meeting. Pressed Metal Institute head tells of supply difficulties

REPRESENTATIVE Fred A. Hartley Jr. (R., N. J.) in Philadelphia last week expressed satisfaction over the manner in which the Taft-Hartley Management Relations Act, of which he is co-author, is beginning to take hold.

"Despite the tremendous campaign which has been waged to prevent an understanding of the provisions of the new law, despite the pressure which is being exerted on local unions and on employers to by-pass the law, there is already very clear evidence that the new law is working and that it is encouraging sound collective bargaining," Representative Hartley said.

Speaking before approximately 1000 industrialists and labor relations experts, he cited various recent developments which point to the effectiveness of the new law, and warned both management and labor that the law was passed in the public interest and that any effort "to evade or short-circuit it will properly be regarded by the public as a shirking of responsibility and an utter disregard for the public welfare."

Representative Hartley spoke at a luncheon at the Bellevue-Stratford hotel, Sept. 9, sponsored by the Philadelphia district members of the Pressed Metal Institute, Cleveland, with the co-operation of the Chamber of Commerce of Philadelphia and the South Jersey Manufacturers Association.

It was the first meeting of the new season for the Philadelphia chapter of the institute, an occasion that was also featured by a meeting of the trustees of the national body—20 of the 25 members of the board being present.

Walter A. Gorrell, district institute chairman, and president, E. J. McAleer & Co. Inc., served as toastmaster, and introduced a number of special guests, in addition to scheduled speakers.

Thomas J. Smith Jr., president, Pressed Metal Institute, preceding Representative Hartley on the luncheon program, pointed to "the serious maldistribution of steel sheet and strip now plaguing our industry," and charged steel producers with having ignored with "arrogant disdain" implications of an unfair and unequitable distribution of metals. Also they insisted, he said, there was no gray market of any significance.

The stamping industry, he declared, needs several times as much sheet as it required in 1939. "Unfortunately, this need of ours," he said, "has matured at a time when there has been an increase of 64.7 per cent in the number of users of iron and steel in 1946 over 1939, and these users, like ourselves, all face far larger demands for these products than they have ever experienced before."

Referring to the basing point question again confronting the steel industry, Mr. Smith said, "Stamping manufacturers are faced with the possibility that steel may be sold f.o.b. mill eventually."

Changes in Executive Staff Announced by The Gleason Works

ARTHUR L. STEWART

E. BLAKENEY GLEASON

JAMES E. GLEASON

SEVERAL changes in the executive staff of The Gleason Works, Rochester, N. Y., builder of bevel gear machinery for over 80 years, were announced recently following the annual meeting of company directors.

James E. Gleason was named chairman of the board; E. Blakeney Gleason was elected president and Arthur L. Stewart was named vice president. In addition, two other officers were re-elected, Miss N. A. Bullis to be secretary, and Randolph Carlson to be assistant secretary.

At an earlier meeting of stockholders Lawrence C. Gleason was elected a director, while James E. Gleason, E. Blakeney Gleason and Mr. Stewart were re-elected to the board.

In addition to serving as president E. Blakeney Gleason will retain the office of treasurer as well as continuing as general manager. Also, Arthur L. Stewart in addition to serving as vice president will continue as chief engineer.

James E. Gleason is a son of the founder of the company and has been connected with the organization since 1884. Upon the death of his father, William Gleason, in 1922, he succeeded to the presidency of the company and, until 1943, also served as general manager.

E. Blakeney Gleason has been connected with the company since 1927. He was elected a director in 1934, in which year he also became second vice president. In 1935 he was appointed assistant general manager, and in 1943 general manager. He became first vice president in 1945.

Arthur L. Stewart joined The Gleason Works in 1909 and became chief engineer in 1917. He was elected a director of the company in 1922.

Lawrence C. Gleason has been associated with the company since 1932 and his activities largely have been identified with the operation of the pattern shop and foundry. In 1938 he was elected assistant treasurer.

Windows of Washington

Administration policy-makers showing disposition to hold off decisions on foreign and domestic issues with extra session of Congress this fall seen a likely possibility. Fear congressional action may negate measures taken now

POSSIBILITY of an extra session of Congress this fall may slow down, rather than hasten Washington reaction to situations at home as well as abroad. This became evident last week after the suggestion was advanced that Congress be recalled ahead of the regular January date.

In the likelihood that Congress will re-assemble, a disposition on the part of departmental policy-makers to hold off on independent decisions was to be expected, and last week was seen to be running true to form. They do not want to take a stand, only to have Congress decree something else a month or so later. But the most cogent reason is that Congress is going to be asked to pass some emergency appropriations, and the possibility that an agency may have extra funds to work with in that event, influences the outlook.

A case in point is the sort of procurement establishment needed to implement the Marshall Plan. Congress will have to pass on major features of the plan now developing, in any event. The disposition here is to wait for congressional action before going too far along.

Discuss Procurement

Indications are that the job may lodge with the Procurement Division of the Treasury Department which performed similar functions in the war, on an expanded scale. This is expected to be one of the matters considered at the series of conferences scheduled for the next several days here, between interested government and industry representatives.

It is likely that the foreign aid situation may dominate the hearings into steel shortages when Sen. Edward Martin (Rep., Pa.) resumes these late this week, with Eugene G. Grace, Bethlehem Steel Co., Benjamin Fairless, U. S. Steel Corp., Admiral Ben Moreell, Jones & Laughlin Steel Corp. Tom Girdler, Republic Steel Corp., and other top steel industry figures expected to appear.

As to the return of Congress, the matter is shaping as a political issue, as well as national question. Some of the more extreme opponents of administration foreign policy are openly suspicious of "foreign crises" as a means of dragooning Congress into action it would be reluctant to take under present conditions. Even a moderate like Senator Vandenberg (Rep., Mich.) was unwilling last week to say more than that the President would have to assume the initiative.

If Congress should return, early indications were that it would do so only shortly before it is scheduled to assemble anyway. The disposition last week was to await the return of congressional delegations now abroad and of course, the President was out of the country at the time. But the pressure for a session was fomenting in Washington, one argument being that with the program already lined up for the regular session there would scarcely be time in the interval before the get-away for the elections to do it all, even without the extra burden of the foreign developments to consider.

Congressional committees will still be in Europe in October, and upon returning, doubtless will take some time to shape their conclusions. The report of the Harriman Committee, headed by Secretary of Commerce Harriman, now studying American resources that might be available for European aid, may not be ready for another month, although the committee is meeting regularly and will meet this week.

This and other factors indicate that if Congress returns, it will be November.

MAJ. GEN. W. H. DRAPER, JR.

Major General Draper has been appointed by President Truman to be Undersecretary of the Army when the new unified national defense organization goes into operation soon. He has been economic adviser to Lt. Gen. Lucius Clay in Germany. NEA photo

To Decommission Vessels

Between 1000 and 2000 ships of the Maritime Commission's wartime merchant fleet are scheduled to be laid up during the coming 12 months. Plans so far call for decommissioning only, which will mean the ships will be in bare-boat state when laid by. Surveys are now under way to determine what equipment and extras will be surplus such as tools, wire, steel parts, etc.

Also in abeyance is the question of what ships to break up. The Navy probably will have to decide how many, and which ships it may have future use for, before any final word on scrapping is heard. Some equipment has started to move ashore meantime, and increasing amounts of surplus are expected to be announced as the program takes form.

FTC Protects Trade Names

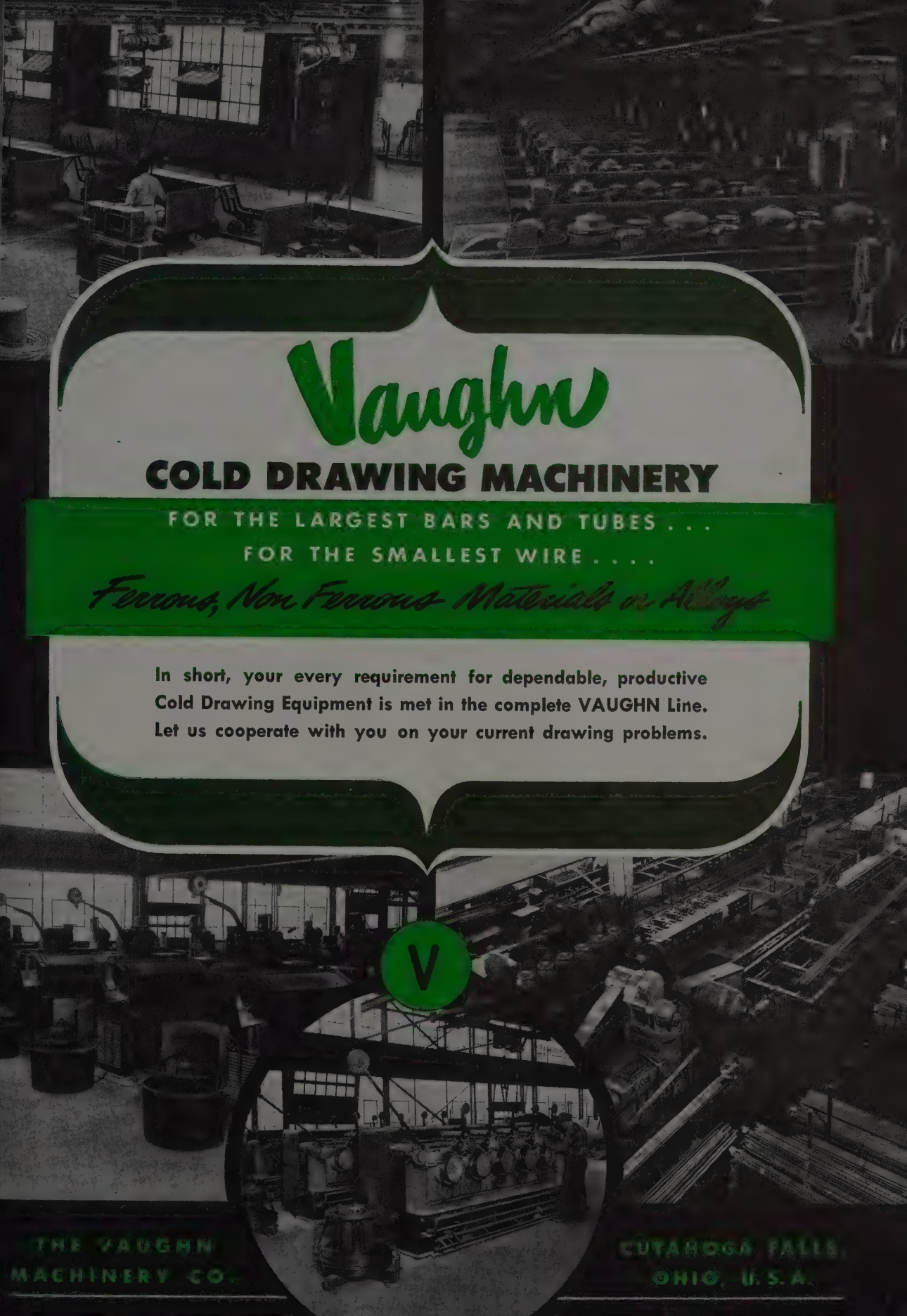
The Federal Trade Commission has launched a move against firms and individuals which appropriate well-advertised and established trade names as part of the title of their own concerns, such as Underwood, associated in the public mind with a nationally-known product, and which has been found being used as part of the title of a concern selling entirely different items; or a razor sold under the Elgin name, associated in consumers' minds with another product.

Eight Chicago corporations last week were ordered by the commission to discontinue the unauthorized use of "well-established and highly regarded trade names, as well as other misrepresentations with respect to the identity, origin, character, value," etc., of their merchandise.

Mining Loans Being Made

The Reconstruction Finance Corp. is continuing to make mining loans under existing authority, despite repeal of Section 14 of the RFC Act, under which the agency was previously authorized to make development loans to operators of gold, silver, tin and strategic mineral mines.

The RFC points out that it can make loans to business enterprises, under existing powers and is continuing to receive and consider applications for mining loans



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FOR THE SMALLEST WIRE . . . .

Ferrous, Non Ferrous Materials or Alloys

In short, your every requirement for dependable, productive Cold Drawing Equipment is met in the complete VAUGHN Line. Let us cooperate with you on your current drawing problems.

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under this authority. Mining loans, however, must be of such sound value, or so secured, as to offer reasonable assurance of repayment or retirement of the loan, it was stated.

New Use for Diamonds

Research at the National Bureau of Standards on radioactivity has revealed that diamonds are radio-active sensitive, hence single-crystal colorless diamonds can be used as counters in exactly the same way as the man-produced Geiger-Muller counter. This device is used in detecting or measuring alpha, beta and gamma rays emanating from radio-active material.

Gamma radiation, for which diamonds have now been proved valuable, is used industrially in the radio-graphic process for examining large metal pieces, among others.

Diamonds were shown by the research to be at least 1000 times more sensitive as counters, size for size than the man-made counter, and the diamond counter is practically indestructible, as compared to a life of three months to two years for the ordinary counter, depending on use. Extremely long use of the diamond, it was said, does tend to produce discoloration or flaws which would end its usefulness eventually.

Lists Uses of Minerals

Some 200 commercially-significant minerals and their principal industrial uses are listed in the Department of Commerce publication, just announced, "Industrial Uses of Selected Minerals."

Purpose of the publication, the department explains, is to assist state, regional and local planning and development agencies in promoting area development, guiding them in classifying the nature and type of industries physically appropriate to the minerals known to be available in their localities.

Antimony Controls Eased

Government restrictions on antimony were modified last week to control over acceptance of deliveries only.

Under this procedure, buyers authorized to accept delivery may buy from any commercial source; exporters no longer require authorization to ship, since they will be required, in the first place, to show permission to receive the antimony. Canadian purchasers will be required merely to certify to suppliers that they have authority from the Office of Materials Distribution to accept delivery.

The change was said by OMD to be in the direction of simplifying administration of the order. It is expected that overall shortages will again develop, though current supplies are adequate for domestic needs. However, said OMD, regulation of delivery is believed to be a sufficient control, even in case of another shortage.

FRIENDLY RELATIONS: Shaking hands with Argentina's Foreign Minister Juan Bromaglia, left, is Sen. Arthur H. Vandenberg (Rep., Mich.), member of the American delegation at the Inter-American Defense Conference, Petropolis, Brazil. NEA photo

Study Statistics Problems

Statisticians from 55 nations began meeting in Washington this week to evolve solutions to problems of statistics as between nations.

Some of the matters considered include comparability factors, the role of the new statistical commission of the United Nations, and co-operation between regional organizations. One of the early tasks completed is a questionnaire draft to be used throughout this hemisphere, in the first international census, to be taken in 1950. This will cover population, resources and geographic information of various sorts, among other data.

Greek Aid Procurement

The federal government will utilize private trading channels to the maximum in arranging for procurement of about $75 million worth of goods under the Greek aid program, Office of International Trade, Department of Commerce, has announced.

The government's position on procurement was explained at a recent meeting between OIT's Export and Import Advisory Committee and officials of the Department of State and OIT. It was emphasized that the government intends to call upon commercial sources in the U. S. and Greece to aid in implementing the program, but that the government reserves the right to make direct purchases when necessary.

Need Hydroelectric Facilities

Additional sources of hydroelectric power will become increasingly necessary to southern California's mushrooming industrial growth as time goes on, preliminary surveys of the U. S. Bureau of Reclamation indicate.

Both industry and governmental leaders in the area are pressing for early action centering around projects for erection of two new dams to supplement energy production now concentrated at Hoover Dam at Boulder City, Ariz.

One such dam site already proved satisfactory by surveys is Bridge Canyon at the end of Lake Mead, 113 miles above Hoover Dam. The other, where drilling tests are being made by the federal bureau and also by the Los Angeles Department of Water & Power, is at Glen Canyon, some 250 miles farther upriver, near the Utah border.

Both projects are for the derivation of power, primarily, as southern California's water supply storage facilities now are regarded as adequate for a population of 8 million.

The long-range program, when completed, would triple the supply of hydroelectric power.

Worker Productivity Increased as Result of "Co-operation" Programs

Plans of several hundred companies to raise output per man-hour studied by American Management Association. Many stress avoidance of collective bargaining issues in co-operation meetings, support of management, and consultation with workers

POSSIBILITIES of increasing worker productivity through encouraging co-operation between management and employees are being investigated by an extensive analysis being made by the American Management Association, New York. Industry programs designed to raise productivity through formal plans of worker co-operation, the results accomplished and the reasons for success or failure are being studied. Many companies report improved productivity as result of their programs.

Special emphasis is being given to: 1. Unusual or especially successful methods undertaken by management to obtain co-operation from employees; 2. important ways in which the unions have aided in increasing productivity; 3. companies' future plans for more output.

Programs of more than 200 companies making formal efforts already have been studied and AMA has issued a summary of the findings.

Many companies having formal programs to increase productivity stress the necessity of: 1. Asking their employees' advice and criticism rather than letting them make the final decision; 2. avoiding collective bargaining issues in the co-operation meetings; 3. top management support.

Subjects of co-operation discussed are, in order of frequency:

	Total
1. Regular attendance	99
2. Safety	95
3. Furthering employee understanding of company policies	93
4. Elimination of waste	91
5. Job evaluation	67
6. Quality control	66
7. Maintenance of tools	63
8. Lateness	63
9. Physical working conditions	59
10. Employee insurance plans	58
11. Employee health	53
12. Training, apprenticeship, induction programs	53
13. Methods improvement	52
14. Incentive system	49
15. Discipline control	48
16. Labor turnover	43
17. Setting output standards	35
18. Production planning	35
19. Promotional programs	35
20. Utilization of machinery	34
21. Technological changes	29
22. Employment stabilization	23

As direct results of these efforts, 56 companies state that the co-operation of employees is now better then before, nine said it was unchanged, and two stated it was worse.

Many companies believe inducements should be given to their employees to increase productivity:

	Number of Companies
Higher time wages	37
More stable employment	28
More generous benefit plans	28
Higher piece rates	15
More advisory functions for employees	9
Shorter hours	5

A number of companies stressed bonus plans, especially group bonuses, suggestion plans, and non-financial incentives.

Twenty-eight companies believe stricter discipline would be more conducive to an increase in productivity than consultation. Twenty-six companies feel their unions have made no contribution toward increasing productivity in any way, twelve are doubtful about their union's contribution, and eight believe the limit of their efforts to increase co-operation has been reached. Some of these companies think the absence of a formal plan of co-operation with employees had not been detrimental to competitive efficiency. It should be noted here in regard to increasing discipline that 46 companies say that such a measure would not be helpful in raising productivity (17 think a combination of increasing discipline and co-operation plans would be best). Forty-five companies report their unions made some kind of constructive contribution to the increase of productivity, and 79 state that the limit of their efforts to increase co-operation had not yet been reached.

To make its productivity study more realistic, AMA's research staff is at present interviewing various levels of management, union representatives, and employees.

Produces $60 Million Worth Of Equipment in Half Year

National Cash Register Co., Dayton, O., produced $60 million worth of cash registers, accounting machines, adding machines and supplies during the first six months of this year, largest output in its history, according to S. C. Allyn, president.

Mr. Allyn pointed out, however, that all profits and more were put back into the business. He said that, in addition to a $5 million profit that was reinvested, the company had found it necessary to obtain another $5,500,000 by increasing bank loans.

During the first half of this year the company invested $957,152 in new machinery, $1,544,000 in tools for new products, and $4,939,704 in increased inventories of work in process and in raw materials.

Chicago's August Industrial Developments Show Increase

Industrial developments in the Chicago area in August amounted to $17,025,000, compared with $5,621,000 in August, 1946. These developments include construction of new buildings and additions to plants, purchase of land for future construction, and acquisition of existing buildings for industrial purposes.

Harbison-Walker Purchases Firm at East Liverpool, O.

Harbison-Walker Refractories Co., Pittsburgh, has purchased the Louthan Mfg. Co., East Liverpool, O.

Louthan was founded in 1901 and at first produced pins, stilts and similar supplies. It has enlarged its field of operation to backwalls and radiants for radiant type gas heaters, and electric appliance ceramics.

Acquisition of the Louthan plant opens a new field of products to Harbison-Walker.

Metal Symposium Meets In Cleveland on Sept. 27

The third annual symposium on Modern Metal Protection, sponsored jointly by the Cleveland sections of American Chemical Society, Electrochemical Society and American Institute of Chemical Engineers, will be held at the Hotel Carter, Cleveland, Sept. 27.

Two technical sessions will be devoted to discussions of "Corrosion Behavior of High Nickel Alloys and Stainless Steels," "Selection of Protective Coatings for Metal Protection," "Corrosion-Resistant Chemical Equipment of Stainless Steels," "Corrosion Resistance of Hastelloys and Application in Processing Equipment," "Synthetic Rubber Derivatives as Corrosion-Resistant Protection," and "Protective Coatings for High Temperature Application."

British Steel Nationalization To Be Pressed

Trades union leader tells conference no change in proposed government policy contemplated

BIRMINGHAM, ENG.

DOUBTS as to the government's intentions on nationalization of the steel industry have been removed by the announcement made at the conference of the Trades Union Congress by President G. W. Thomson when he said he had been assured by the Minister of Supply that there would be no change of policy and that the government intends to proceed in accordance with the terms of the resolution passed by the House of Commons on May 28, 1946, to bring forward proposals in the lifetime of the present Parliament for the transfer of appropriate sections of the industry to public ownership.

The necessary legislation, he said, was being prepared, but it was too early to say whether it would be possible to include it in the program for next session.

This question of nationalization has been hanging over the industry for a long time. Nevertheless the steel manufacturers are continuing with their plans to raise production to the highest possible level. Much will depend upon the fuel available in the coming winter.

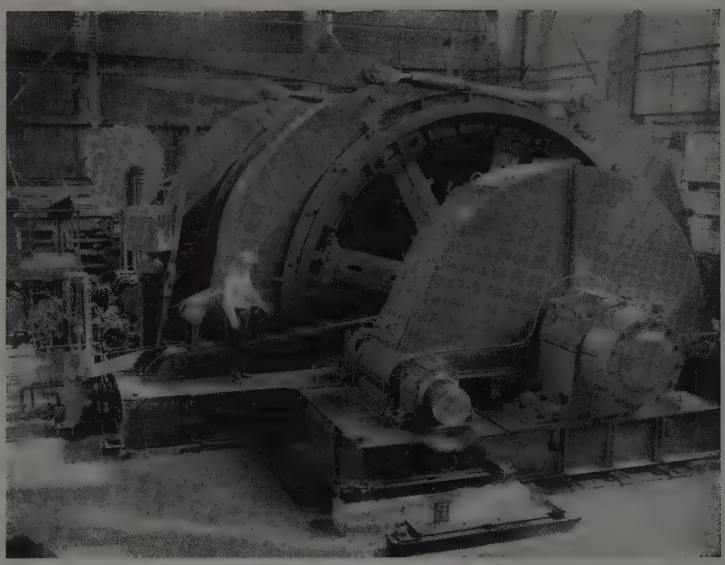
Coal Tonnage Lost

Owing to the strike in the Yorkshire coal fields, at present there has been a loss of almost 300,000 tons of coal, and 50,000 industrial workers in Yorkshire are threatened with short time due to diminishing stocks.

During the last 12 months plans have been started in the industry to run on oil rather than coal, but recently the government decided that no more licenses could be permitted for further conversion of plants to oil.

The recent rise in the price of coal is a serious matter. Approximately two tons of coal are used in the production of a ton of steel so that the increase of 4s means a substantial rise in the cost of steel production.

In addition, there is the extra cost of bringing to a modern steel plant the vast quantities of coal, iron ore, and limestone, and the higher delivery charges on the finished product. To cover these increases it is anticipated that a substantial rise will take place in steel prices this autumn.



MINE HOISTS FOR EXPORT: One of several heavy duty mine hoists being manufactured for export by the Hardie-Tynes Mfg. Co., Birmingham, Ala., is shown above. Hoist, exclusive of electrical equipment, weighs more than 500 tons, has maximum horsepower at 5700

There is little change in the general position affecting supply and demand. Having passed the holiday season, consumers are pressing for as much steel as possible, but it is significant that even industries scheduled under the priority list are not getting anything like the tonnage they require. The shipbuilding industry, for example, is passing through a period of frustration which seems unlikely to end for a considerable time. Due to lack of supplies not only of steel, but of timber and nonferrous metals, some of the shipbuilders have been obliged to reduce their labor force.

The automobile industry also has to restrict its activities because of limited supplies of metal. The bulk of the automobile output during the next few months will be for export, but unless more supplies of raw material and fuel can be found between now and the end of the year even the present rate of output is not likely to be maintained.

More blast furnaces are expected to be brought into commission during September, this being part of the plan to secure expansion of pig iron production. Despite the shortage of skilled labor and foundry pig iron, the light castings trade made a record output in second quarter. This, however, did not satisfy the demands of consumers as a very big business is being done by makers of light castings with the building trade.

The position in regard to semifinished steel has altered little. Rerolling works expect further contraction of imports due to the economic crisis and they are therefore pressing for supplies from makers in South Wales and the North of England. At the finishing mills all order books have backlogs and these conditions are likely to persist for years to come, according to authorities in the industry. Steel for railroad work such as the building of passenger coaches and freight cars is wanted urgently. Makers are actively engaged at present in dealing with the requirements of home railroads where rolling stock has been depleted because of war conditions and trade in the overseas market still falls short to a great extent of the tonnage transacted prior to the war, though some of the leading rolling stock builders are now well on the way to securing a bigger proportion of this class of work.

The urgency for supplies of steel for the electrical industry is brought about by the necessity for providing more generating plant, and the tonnage of steel order on this account is considerable.

Czech Production of Rail Rolling Stock Declines

Production of rolling stock in Czechoslovakia in the second quarter this year dropped about 100 cars from the preceding quarter's monthly production of about 1400 freight cars, according to a consular report to the Department of Commerce, which attributed the decline to conversion of part of the facilities to passenger coach output.

Demand for Steel Taxes Capacity Of Pacific Northwest Rolling Mills

Rising costs have done little to stem overall requirements, although many jobs are not being awarded immediately, with the second call for bids often involving less steel. One large construction project pending

SEATTLE

ROLLING mill capacity is taxed with current orders, with demand heavy for both public works and industrial use. Requirements for both merchant and reinforcing steel bars are extremely heavy.

While rising costs do not appear to have stemmed overall demand, many jobs are not being awarded immediately but are held up for revision, with the second call for bids often involving less steel.

Largest construction project pending is the University of Washington medical center, involving 1350 tons of reinforcing. First bid figures totaled $1,350,000 in excess of the funds available and have been rejected and second call issued for bid Sept. 23.

Fabricators Pinched

Fabricators report a continued inadequate supply of steel and commitments are held in line with shapes available. For this reason many firms cannot bid on larger projects. Current business is confined mostly to small jobs involving less than 100 tons each. Inquiry continues strong. Pacific Car & Foundry Co., Seattle, will supply about 100 tons for the Pasco pumping plant. Washington state will open bids Sept. 23 for a steel truss bridge in Lewis County, involving 260 tons. An unstated tonnage is required for a steel warehouse, Canyon Ferry, Montana, bids Sept. 30.

No large plate jobs are up for figures but shops report plenty of work involved in small contracts for boilers and tanks to maintain near capacity operations. Plates are in poor supply while the shortage of sheets is a severe handicap. Cottage Grove, Oreg., will call bids soon for proposed 12-mile water supply line estimated to total $400,000. This is to replace a section to be submerged by the Dorena dam. Army engineers will construct an additional 6 miles. Plate tonnage involved in this project is unstated.

Jobbing houses are enjoying a steady volume of business, equal to if not above that of a year ago. In spite of higher prices the buying public is absorbing practically everything that is available. While stocks are badly broken, houses are slowly increasing inventories on some items. There is no improvement in the sheet situation; nails, wire and pipe continue scarce while plates and bars are hard to get. Alloys and tool steel are reported easier. Some attempted black market operations in the critical items are reported.

Little activity is noted in the cast iron pipe market but renewed interest is expected following the seasonal quiet. While delivery dates have been advanced due to improved position of the mills, water shipments are uncertain because of strike difficulties in the maritime industry. Seattle has called bids Sept. 16 for about 550 tons of 8 and 12-in. class 150 bell and spigot.

Foundry operations are steady in proportion to construction activity. Plants are paying $27.50 for cast iron scrap which is reported in a somewhat easier position following several weeks in which supply declined. Furnaces are shipping pig iron in fair tonnages to this area, although the demand has declined. The price is firm at $36.50, Provo, Utah.

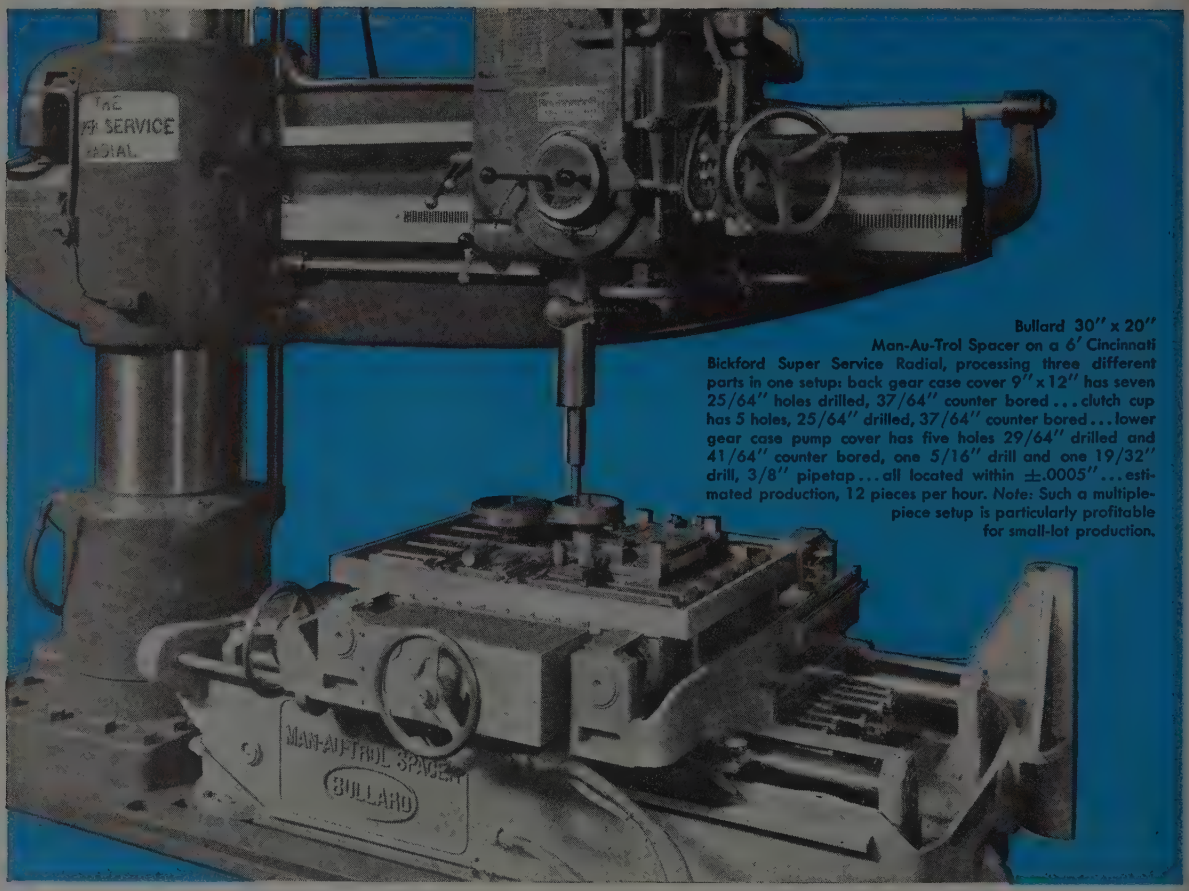
The steel scrap market is holding its own, although receipts are insufficient to replenish inventories. Practically all current shipments are being consumed. The local price is unchanged at $22 at plants but varies at outside points in proportion to the freight rate. Local mills are able to obtain little material in the Portland area where demand has increased and where it is reported California buyers have made invasions. A recent survey of WAA adjacent depots uncovered only a small tonnage of scrap, most of the material being above scrap grade.

Denver has called bids Sept. 25 for circuit breakers and arresters, Sept. 30 for switches and transformers for the Coulee power plant. Other invitations includes: Oct. 7, 80,000-gallon water tanks and accessories for Canyon Ferry, Mont.; Oct. 9, hollow metal doors for Payette pumping plant, Idaho; Oct. 21, control equipment, transformers and other equipment for Anderson Ranch power plant, Boise project.

New West Coast Firm To Manufacture Gas Furnaces

New market for sheet steel will be opened in the San Francisco area this month when Sequoia Mfg. Co. begins production of heating and air conditioning units for residential use. The company, which has just completed a $100,000 plant, will use assembly line methods in producing gas furnaces, and expects to produce 500 units a month.

AUTOMATIC SCREW MACHINES: One of the largest banks of automatic screw machines for the manufacture of brass and aluminum products west of the Mississippi has been installed at the Torrance, Calif., plant of the Harvey Aluminum & Brass Division of the Harvey Machine Co. Inc.



Bullard 30" x 20" Man-Au-Trol Spacer on a 6' Cincinnati Bickford Super Service Radial, processing three different parts in one setup: back gear case cover 9" x 12" has seven 25/64" holes drilled, 37/64" counter bored . . . clutch cup has 5 holes, 25/64" drilled, 37/64" counter bored . . . lower gear case pump cover has five holes 29/64" drilled and 41/64" counter bored, one 5/16" drill and one 19/32" drill, 3/8" pipetap . . . all located within ±.0005" . . . estimated production, 12 pieces per hour. Note: Such a multiple-piece setup is particularly profitable for small-lot production.

NEW BULLARD MAN-AU-TROL SPACER

Eliminates Hole-Locating Jigs and Fixtures

The BULLARD MAN-AU-TROL SPACER now on the production line is more than living up to its advance notices. Machines and men formerly tied up on the non-productive work of making hole-locating jigs are now doing the kind of productive work that cuts operating overhead, develops competitive price advantages and steps up profit. Drilling, boring, reaming and tapping volume and accuracy are reaching new peaks . . . while operators' fatigue is measurably reduced.

To bring yourself up to date on this revolutionary new hole-locating method, write for complete information. **The Bullard Company, Bridgeport 2, Connecticut.**

BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Preview of what auto manufacturers are planning in way of new models offered. Timing of introduction will vary from plant to plant as tools and dies, materials and market conditions warrant. Revisions being made constantly

DETROIT

IN PREWAR years, this was the season when humming assembly lines were grinding to a stop, while production equipment was being changed over to new models. Extensive rearrangement of machine tool equipment, installation of new dies in presses and a general cleaning up of plants was in process, followed by the appearance of a few pilot models inching their way down the final assembly conveyor while crews sought to work out the "bugs" before the main flow started.

This September there is no such activity. When assembly lines stop it is because of shortages of materials and parts. There are few new dies being spotted in stamping presses, and the only bugs appearing are those incident to unrelenting pressure on production. However, new models are on the way. The timing of their start varies from plant to plant and is being subjected to continual revision because of unexpected delays in new tooling, coupled with a good measure of official indecision. After all, as long as dealers can sell—and the word is used in its loosest sense—every car the factories can ship them without apparently making even a small dent in order backlogs, not much incentive is present for pushing the introduction of new passenger car models.

To understand the overall picture best, it may be well to run down the list of manufacturers and review the position of each as regards new models. Details of course are not official, but represent what can be corralled from opinion throughout the trade and supply industries around the motor capital. Here's about how it looks:

BUICK

The 1948 models have been shown in mockup form privately to a few individuals who report they are "knockouts." Bodies are entirely redesigned, being an inch or two wider (approximately flush with the fender line), a trifle lower, with improved vision, particularly rearward. A Buick-designed automatic transmission apparently will be an optional accessory, and is said to be somewhat simpler than the present General Motors Hydramatic transmission used in Cadillac and Oldsmobile models. Equipment has been ordered for production of the unit in the Buick axle and transmission plant. Date for introduction of the 1948 model is sometime after the first of the year, possibly in January. A shutdown during the holidays for inventory might permit changeover of equipment for a start on the new stuff immediately afterward, although this is contingent upon many factors relating to equipment delivery, installation, etc.

Automobile Production

Passenger Cars and Trucks—U. S.

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	399,717	84,109
March	441,793	140,738
April	449,388	248,108
May	390,629	247,620
June	418,919	216,637
July	396,932	331,100
August	357,067*	359,111
September		342,969
October		410,510
November		380,664
December		380,908
12 ms.		3,268,456

* Preliminary.

Estimates for week ended:		
Aug. 23	84,726	91,360
Aug. 30	88,098	74,960
Sept. 6	84,516	72,535
Sept. 13	105,000	87,388

CADILLAC

The luxury line of the GM family likely will follow a similar pattern to Buick and Oldsmobile, with completely new bodies featured after a changeover period early next year. As a matter of fact, there will be the usual basic similarity between the new B-O-C bodies which has always been followed by Fisher Body to spread tooling costs over a greater number of cars and thus reduce the unit cost. Differentiation between models carrying the same basic lines is easily possible by different molding, hood and fender treatments. Eventually Cadillac will make a change in engines in the direction of the high-compression type developed experimentally by Kettering and his associates in the past few years, but this is not likely before 1949 or 1950 models. Economy advantages of the new-type engine (33 per cent saving in fuel for comparable horsepower) would be particularly advantageous in Cadillac which has always been long on style, weight and appointments, but short on gasoline economy. Possibility is seen of an early change in the design of the Hydramatic transmission in the interest of greater efficiency and more simplified construction. Cadillac could logically carry the ball with this new feature. Broadening of the number of different body designs, color combinations, upholstery treatments, etc., is a distinct probability.

CHEVROLET

The recent one-week shutdown of manufacturing and assembly plants should have provided time for inventory-taking and the reinforcement of steel supplies so that present models can be continued right through the balance of the year, with a quick change to 1948 models in January. They will feature only minor style changes—facelifting as it is called—since the designs originally proposed for 1948 jobs and the dies for them were scrapped over a year ago. The next major design change will come in the summer of 1948, and preliminary tooling for these 1949 models already has started through the mill. The trend in appearance is definitely in the direction of lower bodies, with curved rear windows such as featured by Studebaker. The Chevrolet overhead-valve 6-cylinder engine is the ideal type of basic design for modifying to the high-compression Kettering design, although this will not come for probably three or four years, since innovations are usually made in the higher-priced, lower-volume GM lines first. Chevrolet's principal effort now is in the direction of stepping up production, expanding parts manufacturing and assembly plants, and lowering costs by manufacturing innovations, more mechanization and more conveyorization. Eventually Chevrolet will have automatic transmission, but it is not seen in the picture for 1948 or 1949, although Ford's move in this direction could alter the outlook. GM engineers have repeatedly said the cost of building this type of transmission would have to come down appreciably before it would interest Chevrolet.

CHRYSLER

This unit and the other divisions of Chrysler Corp. are the "mystery men" of

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IN BID FOR U.S. MARKET: Four British automobile models specially built for the American and Canadian markets are being shown in this country in a barnstorming tour by the Austin Co. Shown above is the 110-hp Sheerline, a luxury model expected to sell at $4500 to $5000. Small models will sell for $1200. NEA photo

the new model parade. The Detroit tool and die industry is perplexed at the lack of any substantial Chrysler business. Even men in the company's own purchasing department have told friends there has been virtually no release of new tooling required for a model change. Thus no radical changes can be looked for inside of nine months to a year, since a major tooling program these days takes that long to be processed. This compares with five to six months prewar. Chrysler models currently are switching to the new "super-cushion" tire, requiring wider and in some cases smaller steel wheels. It is reasonable to expect a modest change in styling of grilles, instrument panels, moldings and gadgetry around the turn of the year.

DE SOTO

This division follows very closely the policy of the parent Chrysler organization, since a good many parts used by the two are interchangeable. Hence the preceding comments will apply equally well to DeSoto. Extension of the Chrysler fluid drive or some advanced modification of it could be an early possibility. Use of brake linings bonded to shoes by "Cycleweld" adhesive process probably will be standard by next year.

DODGE

Main plant of this division in Detroit is the center of many basic manufacturing functions for the entire Chrysler line and any important changes in parts design often are reflected first at this point. There are few signs of any new model activity, or if there are they are kept pretty well hidden. Some classified newspaper advertisements have appeared for die makers, but they do not suggest any important changes. Current body dies, in use since the start of 1942 models, apparently will be continued at least another year, which should permit realization of appreciable savings by virtue of the extended amortization period.

FORD

Biggest model changeover program in the history of the company, perhaps of the entire industry, is in progress, involving expenditures already over a $20 million figure. Completely new bodies—lower, wider, fenders blended in—are being tooled up, although observers say they will not be in production until next April. The models will bear no resemblance whatever to the present Ford line. Dozens of changes are being worked out in processing equipment to reduce costs and improve the product. (Just one, for example, involves the installation of annealing furnaces in close proximity to forging hammers, so hot forgings from the hammers can be transferred immediately to the furnaces, thereby greatly reducing oxidation and conserving the heat remaining in the forgings, usually entirely lost). Designs for an automatic transmission have been kicked around for over a year and as yet no final decision has been reached on just what to build. Numerous changes and new personnel in the higher engineering echelons have been partly responsible for the delays in this program. Transverse springing, long a Ford standby, will be abandoned in the 1948 model in favor of conventional leaf springs in the rear, coils in front. Little is heard of any impending engine changes, except that top engineers are not entirely satisfied with either the 6-cylinder or V-8 power plants. One thing for sure—Ford is out with everything at its command to beat Chevrolet in the production race for top position in the industry. New models of Ford trucks are expected before year-end, since Chevrolet already has introduced its redesigned truck jobs and thus has gained a competitive jump on Ford.

HUDSON

This producer is scheduled to be the first to announce 1948 models, preliminary production of certain components now being under way. Ads are appearing regularly for die try-out and trouble men, indicating the Hudson body plant is in the early stages of the new model. Expenditure of $10 million or more has been made on plant rearrangement and re-equipment. A sharp break with tradition is expected in the forthcoming models, both in appearance and construction. A good hunch is that they will feature the integral type of body and frame such as pioneered by Nash and Lincoln. It appears entirely possible the new series may be introduced in the late fall. Engines probably will remain pretty much as they are except for minor modifications.

KAISER-FRAZER

There will be no model changeover for 1948 but planning is well along on some additional body types, such as coupes, two-door sedans, possibly a convertible. The only type now being built is the four-door sedan. Work also has been started on an original engine design, to succeed the Continental engine now being used; a year or more, however, will be required to get a design tested and in production. No reactivation of the original front-drive Kaiser has appeared, after its failure in engineering tests. Recalling of E. J. Hunt, production wizard who supervised layout of the Willow Run plant and then transferred to the leased Continental engine plant in Detroit, back to Willow Run suggests that a new phase of production planning has been initiated, probably for the engine project. The company is satisfied its body designs are at least a year ahead of the rest of the industry.

LINCOLN

Several millions have been spent on new production equipment, paint ovens, conveyor lines and related installations, most of them in anticipation of 1948 model production. A new motor line is already functioning, although it is slated to shift over from the present 12-cylinder engine to a new V-8 which has been under development for several years. Lincoln is being groomed for a sharper

(*Please turn to Page* 170)

Workmen find Cleveland Tramrail equipment very easy to operate. A starting effort of only 15 lbs. and a running effort of 10 lbs. is required per ton weight.

Cumbersome Materials Moved Quickly and Safely

An overhead crane (see photo at left) for handling materials in one section of a shop, or a Tramrail System (see photo above) for direct transportation to all points in a plant, simplifies the hard job of moving heavy, awkward materials. Work that strains the backs of two or three men can usually be handled with ease by one man in a fraction of the time.

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THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Wean Will Build New Fabricating, Assembly Plant

Firm lets contract for erection of facility for making products unobtainable from normal suppliers

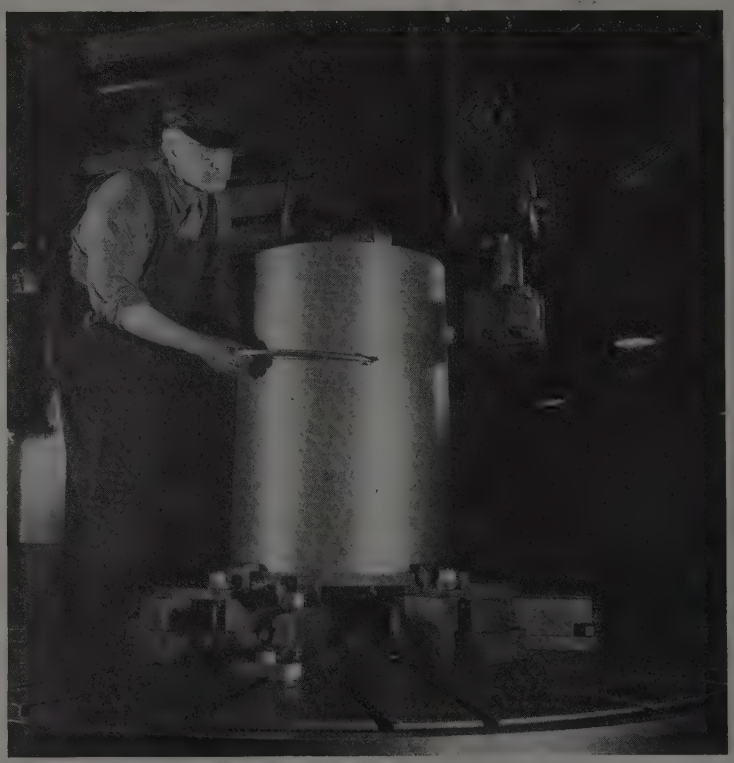
WEAN Engineering Co., Warren, O., has placed a contract with Campbell Construction Co., Warren, for a fabricating plant to be built on property on Ratliff Rd., in Warren, adjoining the main line of the Erie Railroad.

The plant is to be used for the fabrication of materials which can not be obtained from the company's normal suppliers. In addition, it will be used for assembly of export shipments of the sheet, tin and strip mill machinery manufactured by Wean. The company's export demand is increasing, company officials report.

The main building will be 200 ft long by 60 ft wide, and will be equipped with a 25-ton crane. Attached to the building will be a lean-to 40 ft wide running the full length of the main bay. It is expected that the plant will be ready for occupancy early in 1948.

This factory will augment the company's investments in properties and facilities in Cleveland, Youngstown and other districts. Wean Equipment Corp. in Cleveland and McKay Machine Co. in Youngstown are two firms in which Wean Engineering Co. has large interests.

The plant is being located along the Erie Railroad since this line has unusually wide railroad clearances, thus permitting the handling of some of Wean's exceptionally large shipments.



HEAVY BUSHING: Operator calipers outside diameter of 17-in. tapered bore bushing being machined on a boring mill for a 108-in. Magic-Grip sheave being manufactured by Allis-Chalmers Mfg. Co., Milwaukee. One of a pair, this cast-iron, double-arm, 32-groove E section sheave will weigh about 16,000 lb. The two sheaves will be used to transmit 800 hp at 450 rpm motor speed to a 92-in. milling machine

All American Industries Acquiries Indiana Company

All American Industries Inc., New York, has acquired all the outstanding capital stock of A. D. Cook Inc., Lawrenceburg, Ind.

The company, which has been in business for 66 years, manufactures pumps, well supplies and compression type fire hydrants. The pumps are used in domestic water supply systems and power installations. In addition to a plant for the manufacture of its products, the firm has a gray iron foundry for its own use.

This is the third acquisition in allied fields by All American during the current year. Previous purchases were Oklahoma Steel Castings Co., Tulsa, Okla., producer of steel castings, and Fitzsimons Steel Co., Youngstown, O., manufacturer of cold drawn steel bars.

Cornelius O'Brien, president of A. D. Cook, will continue as chairman of the board and all other key personnel will be retained, according to an announcement by Robert C. Hardy, president of All American.

Century America Purchases Woodstock Typewriter Co.

Woodstock Typewriter Co., Woodstock, Ill., has been purchased by Century America Corp., Chicago, for over $2 million. Century America is a holding company headed by Thomas J. Reid, president, who will also act as president of Woodstock. Mr. Reid said that the firm, to be operated as a wholly owned subsidiary, will retain its old name, policy and organization.

Woodstock was founded in 1907 as Emerson Typewriter Co., but was later purchased by Richard W. Sears, one of the founders of Sears, Roebuck & Co. The present company was bought from the heirs of Mr. Sears. In addition to its main plant at Woodstock, the firm has a branch plant at Brodhead, Wis.

Mullins Launches $1 Million Plant Improvement Project

Mullins Mfg. Corp., Salem, O., maker of kitchen equipment, auto parts and a miscellaneous line of stampings, will spend $1 million on improving its Warren and Salem plants this year, President George E. Whitlock has announced.

The Warren improvements, to cost $500,000, will include an enameling furnace, several new presses, a building to house two paint spray booths and standby fuel equipment to protect the plant against natural gas shortages which seriously interrupted operations last winter. One of the new presses will be a 900-ton double action press.

Salem improvements include a new enamel plant, new paint booths, drying ovens and other equipment. In commenting on the program, Mr. Whitlock said the corporation would have spent twice as much for improvement, if it had not been for the steel shortages.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

American Rolling Mill Co., Middletown, O., has purchased for $250,000 a portion of government-owned electric steel-ingot facilities in Middletown.

—o—

Iternational Nickel Co., New York, announces that its Texas Technical Section of the Development and Research Division has moved to Room 1107, Commerce Bldg., Houston, Tex.

—o—

General Bronze Corp., Long Island City, N. Y., is installing three boilers of 50,000 sq ft of direct steam radiation at its plant in Garden City, Long Island, which is now under construction and which will be devoted to the manufacture of architectural bronze and aluminum windows. The boilers were made by Pacific Steel Boiler Division of U. S. Radiator Corp.

—o—

Gibbs Corp., Jacksonville, Fla., has purchased for $250,000 surplus shipyard facilities at Jacksonville which it operated during the war.

—o—

Sherwin-Williams Co., Cleveland, has formed a Great Lakes Industrial Division with headquarters at 112-18 S. Division Ave., Grand Rapids, Mich. With Frank E. Ehrett as manager, the division will specialize in industrial finishes used on metal, wood and plastic products.

—o—

Gathmann Engineering Co., Baltimore, has appointed Basic Refractories Inc., Cleveland, as exclusive sales representative for Gathmann molds and methods of steel ingot production.

—o—

Clipper Mfg. Co., Kansas City, Mo., maker of masonry saws, blades and portable hoists has opened a Cleveland branch office at 208 Noble Court.

—o—

C. H. Hunt Inc., Pittsburgh, firm of consulting engineers, has been incorporated.

—o—

Mountain City Copper Co., Salt Lake City, Utah, recently ordered suspension of operations at its mine and authorized institution of proceedings for dissolution of the company, subject to later authorization by stockholders at a meeting to be called on or before Sept. 29.

—o—

Handy & Harman, Bridgeport, Conn., refiner and producer of silver and gold alloys and silver brazing alloys, has announced it has joined forces with Thomas J. Dee & Co., Chicago, maker of products for the dental profession, jewelry trade and chemical industry. The latter firm becomes the Dee Division of Handy & Harman. Present executives and personnel will be retained.

—o—

B & M Mfg. Co. has been newly formed by Wiley W. McMinn and Olof Brant at 19 N. Harrison St., East Orange, N. J. The company will make spirally formed tubular products.

—o—

Lapeer Mfg. Co., Lapeer, Mich., has taken over Knu-Vise Inc., Detroit, and the manufacture of the company's clamping devices, which will continue to be known as Knu-Vise products. The sales office will remain at the Detroit address, 2208 Eighth St.

—o—

Ajax Engineering Corp., Trenton, N. J., has signed a license agreement with Scomet Engineering Co., subsidiary of Scovill Mfg. Co., Waterbury, Conn., to manufacture Scomet's induction furnaces for melting metals.

—o—

New York University, New York, has established an Institute on System and Procedures. A program of three courses will be offered during the coming fall term, designed to provide business men with practical on-the-job knowledge.

—o—

Hyde Windlass Co., Bath, Me., has purchased a deck machinery manufacturing plant in Bath which it operated during the war for the government. Price was $200,000. Hyde plans to continue the manufacture of special ship machinery and propellers.

—o—

Interstate Mfg. Corp., Newark, N. J., producer of cord sets, heater cords and wiring harnesses for the electrical appliance and automotive industries, has opened a plant at 32-36 Newark St., Newark. Firm's executive offices will remain at 138 Sussex Ave., Newark.

—o—

Neon Fluorescent Engineering Co., Louisville, Ky., has purchased the incomplete plant No. 2 of the Indiana Ordnance Works near Charlestown, Ind., from WAA for $75,000. Firm will use the facility for the production of neon signs, transformers and other lighting equipment.

—o—

National Research Corp., Cambridge, Mass., announces the formation of British American Research Ltd. in Scotland as a joint venture with Daniel Varney Ltd., a Scotch firm engaged in the manufacture of scientific research instruments and laboratory apparatus. New firm will manufacture and sell industrial high vacuum equipment used in fields of evaporation, distillation, dehydration and metallurgy.

—o—

Interchemical Corp., New York, Finishes Division, has established a sales branch at 10 N. Main St., West Hartford, Conn., which will be directed by Robert K. Hungerford.

—o—

Bernard Welding Equipment Co. has been newly formed by Arthur A. Bernard at 741-43 E. 71st St., Chicago. Firm operates its own development laboratory and plant for the manufacture of welding equipment.

—o—

War Assets Administration is offering for sale or lease a carbon black plant at Eunice, N. Mex., designed to produce channel type carbon black and currently operated under interim lease by Panhandle Carbon Co. Bids will be received at Denver until Sept. 17.

—o—

E. W. Bliss Co., Detroit, maker of metalworking machinery, presses, dies, rolling mills and can-making equipment, will vacate its Brooklyn, N. Y., plant Jan. 1 in conjunction with expansion programs at its Toledo, Cleveland, Salem, O., and Hastings, Mich., facilities.

—o—

Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electroplating and polishing supplies and equipment, announces completion of a warehouse at 382 Seymour St., Stratford, Conn.

—o—

Orlandi Gear & Machine Co., Detroit, has awarded national and foreign sales rights for the firm's Orlandi gear checker to Michigan Tool Co., Detroit.

—o—

Chicago Metal Hose Corp., Maywood, Ill., maker of metal hose and expansion joints, has purchased Ft. Dearborn Mfg. Co., Sterling, Ill., and will operate Dearborn as a wholly-owned subsidiary, continuing its service in the field of production machining and as an engineer and builder of special machinery, tools, dies and fixtures.

—o—

War Assets Administration has announced that an aluminum rod and bar mill near Newark, O., is for sale or lease. Operated during the war by Aluminum Co. of America, the plant is reported to have cost the government $23,181,000.

—o—

Chicago Nipple Mfg. Co. recently moved its nipple manufacturing plant and general office to 1616 S. Laramie Ave., Cicero, Ill.

The Business Trend

Strike Will Slow Pace Of Industrial Activity

DROP in steel ingot production due to a wildcat strike of rail workers in Pittsburgh will prevent an immediate return of industrial production to the rate prevailing before the Labor Day holiday. Not only will the strike hold back the current rate of activity but through restricting supplies of steel will exert a depressive effect for some time to come.

The decline occasioned by the Labor Day holiday was modest, with STEEL's industrial production index for the week ended Sept. 6 receding only 4 points from the preceding week. This placed the index at 156 per cent of the 1936-1939 average.

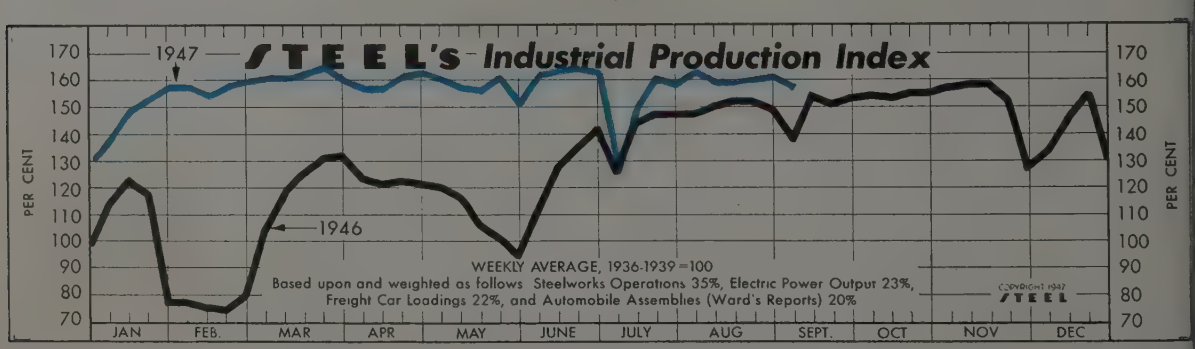
AUTOS — Although production of 84,516 passenger cars, trucks and busses in the week ended Sept. 6 fell below the previous week's 88,098, the average daily output jumped nearly 20 per cent in the short holiday week. Barring unexpected difficulties, auto production in the week ended Sept. 13 was expected to total more than 100,000 units. However, interference with steel production at Pittsburgh may soon shown a depressive effect on the auto makers' accomplishments.

COAL—For only the second time since the coal miners' new wage contract went into effect the weekly output of bituminous coal has risen above 12 million tons. While estimated production for the week ended Aug. 30 reached 12,030,000 net tons it still was below the performance of the corresponding week last year. However, production this year through Aug. 30 was 17.8 per cent ahead of that for the corresponding period of 1946, but that margin is not impressive, considering today's higher rate of industrial activity which necessitates heavy use of coal.

PRICES—Upward spiral of prices continued in the week ended Aug. 30 to boost the U. S. Bureau of Labor Statistics wholesale price index. For that week, the ninth consecutive week of increase, the index registered 154 per cent of the 1926 average. The previous week's level was 153.5 per cent. Chiefly responsible for the latest gain were increased prices for motor vehicles and for some farm products.

RAILROADS—Although net operating income of Class 1 railroads in July was $60,958,451 compared with $63,029,671 in the same month of 1946, the carriers' earnings in the first seven months of 1947 total $429,381,444 against $217,792,257 in the same period of 1946. Railroad earnings in the first seven months of last year were abnormally low, the first six months having included a period of industrial disturbances and railroad wage increases.

EXPORTS—Shipments abroad of machinery and vehicles in July ran counter to the 7 per cent decline in total U. S. exports that month compared with June. Exports of machinery and vehicles rose from $357,300,000 in June to $363,700,000 in July, most of the increase being in industrial machinery whose value in July was $116 million compared with $109,500,000 in June.



The Index (see chart above): Latest Week (preliminary) 156 Previous Week 160 Month Ago 158 Year Ago 138

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	93.0	93.0	95.0	85.5
Electric Power Distributed (million kilowatt hours)	4,721	4,940	4,874	4,184
Bituminous Coal Production (daily av.—1000 tons)	2,005	1,992	1,925	2,086
Petroleum Production (daily av.—1000 bbl.)	5,173	5,157	5,104	4,800
Construction Volume (ENR—Unit $1,000,000)	$122.8	$136.9	$109.8	$86.1
Automobile and Truck Output (Ward's—number units)	84,516	88,098	79,452	72,535

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons.

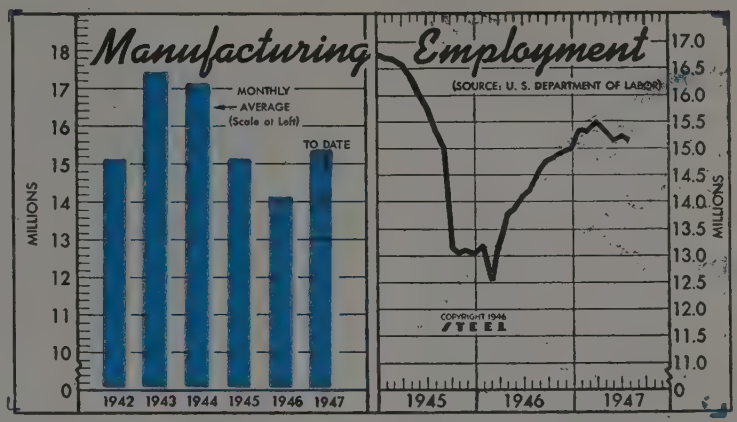
TRADE				
Freight Carloadings (unit—1000 cars)	895†	926	905	794
Business Failures (Dun & Bradstreet, number)	60	64	60	14
Money in Circulation (in millions of dollars)‡	$28,749	$28,302	$28,206	$28,506
Department Store Sales (change from like wk. a yr. ago)‡	—2%	—5%	+1%	+45%

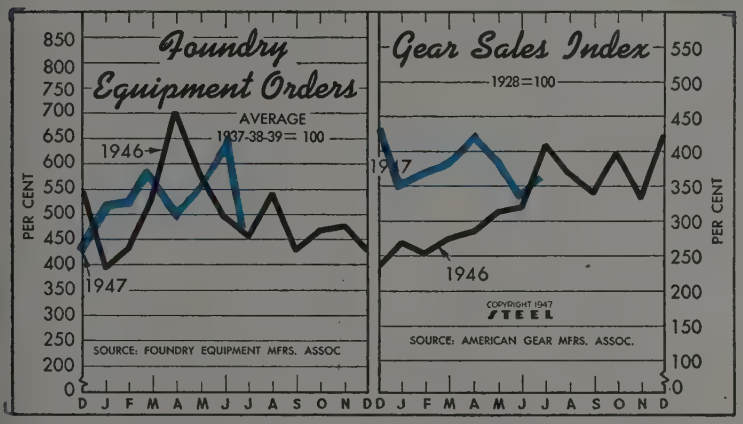
† Preliminary. ‡ Federal Reserve Board.

Factory Employment

(000 omitted)

	1947	1946	1945
January	15,372	13,499	16,696
February	15,475	12,751	16,684
March	15,510	13,433	16,557
April	15,429	14,045	16,302
May	15,237	14,159	16,012
June	15,317	14,371	15,749
July	15,232	14,526	15,331
August	.....	14,876	15,019
September	.....	15,035	13,159
October	.....	15,064	13,048
November	.....	15,271	13,110
December	.....	15,348	13,059
Monthly Ave.	.....	14,365	15,060



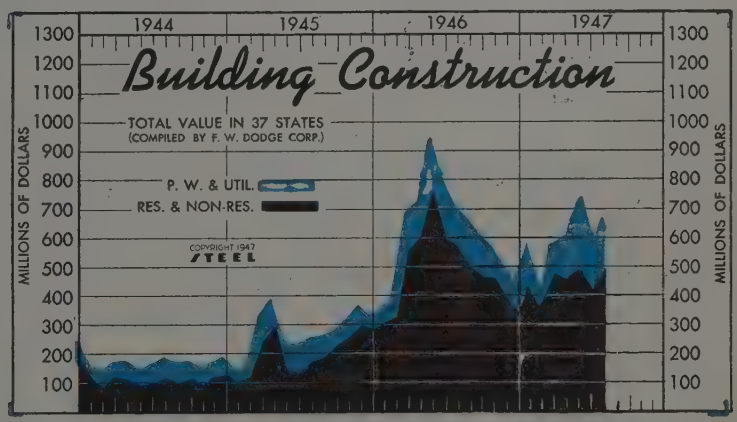

Foundry Equipment Orders
AVERAGE 1937-38-39=100
1946
1947
PER CENT
SOURCE: FOUNDRY EQUIPMENT MFRS. ASSOC
Gear Sales Index
1928=100
1947
1946
COPYRIGHT 1947 STEEL
SOURCE: AMERICAN GEAR MFRS. ASSOC.
PER CENT
D J F M A M J J A S O N D D J F M A M J J A S O N D

	Foundry Equipment Orders Index (1937-38-39=100)			Gear Sales Index (1928=100)		
	1947	1946	1945	1947	1946	1945
Jan.	513.4	392.8	422.4	350	269	323
Feb.	521.9	432.8	465.3	376	253	331
Mar.	573.8	536.6	604.7	380	275	339
Apr.	512.1	701.2	325.0	424	284	296
May	548.6	577.3	404.7	387	313	309
June	649.9	491.7	375.4	343	321	271
July	458.7	453.4	411.7	361	407	264
Aug.	....	538.7	532.2	...	368	205
Sept.	....	424.4	577.2	...	342	213
Oct.	....	469.2	457.8	...	397	251
Nov.	....	477.4	416.6	...	336	255
Dec.	....	430.9	547.6	...	425	239
Ave.	....	493.9	461.7	...	332	275

Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities		Residential and Non-residential	
	1947	1947	1946	1947	1946
Jan.	571.6	113.9	50.2	457.7	307.3
Feb.	442.2	90.5	64.7	351.6	322.7
Mar.	596.8	122.0	143.6	474.8	554.0
Apr.	602.3	161.4	128.1	441.0	606.8
May	742.8	252.9	197.9	490.0	754.6
June	605.1	185.7	202.5	419.4	605.5
July	660.3	165.9	153.1	494.4	564.9
Aug.	....	...	184.4	....	495.6
Sept.	....	.....	156.4	....	463.5
Oct.	....	....	112.8	....	460.4
Nov.	....	....	121.8	....	382.0
Dec.	....	....	115.9	....	341.4
Total	...	....	1,631.4	....	5,858.7



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,109	$11,921	$12,029	$10,055
Federal Gross Debt (billions)	$260.0	$260.0	$259.4	$266.0
Bond Volume, NYSE (millions)	$13.3	$13.4	$14.6	$28.1
Stocks Sales, NYSE (thousands)	2,892	3,059	3,592	10,559
Loans and Investments (billions)†	$63.7	$63.6	$63.5	$60.0
United States Gov't. Obligations Held (millions)†	$38,400	$38,527	$38,739	$41,463

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$75.41	$75.41	$75.41	$64.45
All Commodities†	154.0	153.5	151.3	128.2
Industrial Raw Materials†	167.9	167.7	165.6	142.6
Manufactured Products†	148.9	148.3	146.0	124.5

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

CHARLES F. ERICKSEN

MORTON J. RAINEY

ANTHONY J. SNYDER

The General Electric X-Ray Corp., Chicago, announces the promotion of **Charles F. Ericksen** as personnel manager for Chicago factory and offices. He formerly had been head of the scheduling section of production control. **Eliott Oakes** has been promoted to manager of the newly-created wage and salary rate section, which operates in the Chicago and Milwaukee plants of the company. He formerly had been in charge of job evaluation for the personnel department.

—o—

Troy T. Alverson has been appointed assistant manager of the Dust & Fume Control Division, American Wheelabrator & Equipment Corp., Mishawaka, Ind. He formerly had been a district sales representative for the company, with offices in Baltimore. **Fred E. Ubl** has been appointed district sales representative, succeeding Mr. Alverson.

—o—

Sherman M. Fairchild, chairman of the board, Fairchild Camera & Instrument Corp., Jamaica, L. I., N. Y., is in Europe for a month's study of new developments in aviation, photography, and electronic equipment.

—o—

Wayne J. Hartmann has been appointed district manager in Cleveland for electric appliance sales of the Yale & Towne Mfg. Co., New York, covering Ohio, Indiana and Michigan.

—o—

The Buda Co., Harvey, Ill., announces appointment of **Harry G. Campbell** as sales manager of the DieseLight Division of the company, which handles sales and manufacture of diesel electric and gasoline electric generator sets. Mr. Campbell has been associated with the Westinghouse Electric & Mfg. Co. at Pittsburgh.

—o—

Edward M. Krech has joined the J. M. Huber Corp., New York, as director of purchases, and will make his headquarters in Brooklyn. Prior to joining Huber recently, he had been with the Singer Mfg. Co., Elizabeth, N. J.

—o—

Morton J. Rainey and **Anthony J. Snyder** have been elected vice presidents of the Morse Twist Drill & Machine Co., New Bedford, Mass. Mr. Rainey has been associated with the company for many years in the capacity of general sales manager, and Mr. Snyder, also associated with the company for many years, has been works manager.

—o—

Link-Belt Co., Chicago, announces the following changes in sales management personnel: **James B. Elliott,** divisional manager for Caldwell plant products, has been appointed divisional sales manager at the company's plant in Minneapolis. **Erwin A. Wendell,** district sales manager, Chicago branch, has been appointed divisional sales manager for Caldwell plant products, at the Caldwell plant in Chicago. **T. W. Matchett,** district sales engineer at New York, has been appointed district sales manager, Chicago branch.

—o—

John M. Martin, manager of the Pittsburgh office of Hercules Powder Co., Wilmington, Del., has been appointed assistant general manager of the cellulose products department. This will make two assistant general managers for this department.

—o—

Hollis C. Doss, formerly Kansas City sales manager for the Appliance Division of Enterprise Wholesale Inc., has been made manager of the Kitchen Sales Division of Hotpoint Inc., Chicago, and **Frank L. Sacha,** formerly executive representative for the company in Washington, has been named manager of the company's newly created Water Heater Division. Both men will have headquarters in Chicago.

—o—

R. S. Koroncai, formerly with the National Acme Co. and the Hydraulic Equipment Co., Cleveland, has been appointed district sales manager, covering Ohio and Western states, for Scheneker Iron Works, Buffalo, manufacturer of bulldozer blades and snowplow equipment.

—o—

E. B. Germany has been elected president, Lone Star Steel Co., Daingerfield, Tex., to succeed **John W. Carpenter. W. W. Lynch** has resigned as vice president and director of the company.

—o—

The American Steel Wool Mfg. Co. Inc., Long Island City, N. Y., has appointed **R. O. Dahling** as general sales manager of the company.

—o—

Gordon A. Roberts has been appointed manager of the future demands department, International Business Machines Corp., New York. He previously had been a special representative in the public utility field.

—o—

Gerald E. Felber has been appointed to assistant director of purchases, Buffalo plant, Wickwire Spencer Steel Division, Colorado Fuel & Iron Corp. He succeeds **Arthur R. Kinney,** who recently was named division director of purchases.

—o—

Additional appointments to the staff of the Research & Development Division of Pittsburgh Consolidation Coal Co., Library, Pa., are as follows: **R. V. Safford** will be in immediate charge of the company's coal gasification pilot plant at Library; **Thomas G. Reynolds** has been appointed chemical engineer on coal gasification; **J. Hunter Johnston** has been appointed control supervisor in charge

HARPER fastening NEWS

IN ALMOST *ANY* APPLICATION!

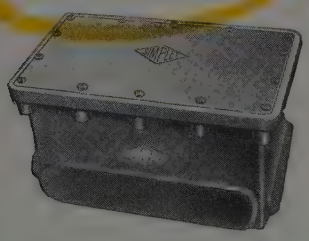
Harper Fastenings of Non-Ferrous or Stainless Steel are Better than Common Steel

SILICON BRONZE PREVENTS "SEASON CRACKING" IN UTILITY POWER LINES

"Season Cracking" is the costly failure of unsuitable metals in power line fittings and fastenings because of seasonal temperature changes and exposure to weather. Experience has proved to Utility men that fastenings of silicon bronze resist cracking, hold securely and will not "freeze" from rust or corrosion. To reduce replacements in any outdoor application use Harper Silicon Bronze fastenings.

Left: A large installation of modern power line switches fastened with Harper Silicon Bronze Bolts.

BRONZE BOLTS PROTECT AGAINST UNDERGROUND DAMP



Junction boxes and pull boxes containing lights, wiring and switches used in underground subway and highway installations must be opened periodically for inspection and repairs. A large manufacturer of such equipment found that common steel bolts used to secure the box covers would corrode quickly in the continually moist environment and "freeze," necessitating costly delays and frequent replacement. By using Harper bronze bolts corrosion is prevented, covers easily removed and bolts reused.

STAINLESS FASTENINGS RESIST FRUIT ACIDS

A large manufacturer of fruit handling equipment faced a typical corrosion problem in a clever cherry stemming machine which he builds. Strength was required at strategic points, workability and flexibility in others. Acid corrosion resistance was essential, of course, in all parts to counteract the strong fruit acids. The forward-thinking manufacturer specified Harper stainless steel for the many bolts, nuts, washers, rivets, wing nuts and setscrews used to provide adequate mechanical properties and corrosion resistance for trouble-free operation, low cost maintenance and long-life of his product.

Brass, Bronze, Monel Metal, Stainless Steel

Harper Everlasting Fastenings are made from Brass, Naval Bronze, Silicon Bronze, Monel Metal, Stainless Steels . . . none from common steel.

The H. M. HARPER COMPANY
2646 FLETCHER STREET
CHICAGO 18, ILLINOIS

Branch Offices—New York City, Philadelphia, Los Angeles, Milwaukee, Cincinnati, Dallas, Cleveland

HARPER *Chicago*

HARPER SPECIALIZES IN EVERLASTING FASTENINGS

of accounting and purchasing sections, and assigned to the service department; and **Warren R. Eakin** has been appointed economist and assigned to the service department. Both Mr. Reynolds and Mr. Safford have been assigned to the development department of the company.

—o—

Morrough P. O'Brien, former dean of engineering, University of California, has joined the engineering staff of Air Reduction Co. Inc., New York, to have charge of general and process engineering, and, on Oct. 1, will assume the direction of liquefaction research, succeeding **Dr. Floyd J. Metzger,** vice president in charge of liquefaction research. Dr. Metzger will engage in private practice as consultant with offices in New York, and will continue on a consulting basis with Air Reduction.

—o—

Banner Iron Works, St. Louis, manufacturer of Meehanite castings, has appointed **Max R. Wise,** Tulsa, Okla., sales agent. Mr. Wise also represents the St. Louis Steel Castings Co., General Metal Products Co., St. Louis, and Arrow Parts Forging Co.

—o—

Dr. Frederick Seitz and **Dr. Roman Smoluchowski** of Carnegie Institute of Technology have been appointed members of the newly organized Committee on Solid State in the Division of Physical Sciences, National Research Council.

—o—

Russell Wilks and **E. M. Cushing** have been appointed, respectively, public relations director and industrial relations director of United States Rubber Co., New York. The two positions were created following the resignation of **Cyrus S. Ching** as chief of the combined departments. Mr. Ching has been named director of the new independent federal mediation and conciliation service created by the Taft-Hartley Act.

—o—

Arthur D. Little Inc., Cambridge, Mass., announces the following additions to its technical staff: **Russell J. Bowen, Robert W. Fabian, Thomas Hall, William V. Keary, Benjamin A. Lambert, Albert E. Mignone, George E. Richter, Richard W. Tindal,** and **Elizabeth Thorogood.**

—o—

Frank H. Schryer has been appointed superintendent of the Peru, Ill., plant of the Meyer Furnace Co., Peoria, Ill. He recently has been connected with the L. J. Mueller Furnace Co., Milwaukee, serving as general superintendent.

—o—

H. Barden Allison has been appointed sales manager of the Gilmer Division, United States Rubber Co., New York. He formerly had been district sales manager of mechanical goods in the Cincinnati district, and will be succeeded there by **Ralph W. Stambaugh.** Other personnel changes in the company's mechanical goods sales organization include: **Purdy Miller,** district sales manager in Buffalo, appointed district sales manager in Indianapolis, effective Oct. 1; **N. W. Swenson** will succeed Mr. Miller at Buffalo; **Paul S. Bigby,** assistant district sales manager at Detroit, named district sales manager at Milwaukee, effective immediately.

—o—

Irvin W. Alcorn, Pure Oil Co., Chicago, has been elected chairman of the Petroleum Division, American Institute of Mining & Metallurgical Engineers.

—o—

Fred A. Thomson has been elected secretary of the Ford Motor Co., Dearborn, Mich., and I. L. Pierce appointed director of the company's service department. Mr. Thomson, formerly assistant secretary, succeeds **H. E. Schluchter,** who has retired. Mr. Pierce's position was established by separation of the service department from the parts and accessory department. **R. W. Hickle** has been named manager of auto accessory sales, and **Arthur W. Kelly,** accounting manager for parts and accessory sales.

—o—

John L. Peet has retired as division superintendent of maintenance at the Gary Sheet & Tin Mill of Carnegie-Illinois Steel Corp., subsidiary of U. S. Steel Corp. He is succeeded by **Irvin Paul,** who has been superintendent of the 80" hot strip department.

—o—

Richard L. Wilcox has been elected president of the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., succeeding **David C. Griggs,** who has been elected chairman of the board. Both of these officials are engineers and long-term employees of the Waterbury organization. Mr. Griggs, associated with the company for 54 years, served first as secretary, later as general manager and vice president, and became president in 1930. Mr. Wilcox joined the company in 1898 as a draftsman, later became chief engineer of the Bolt & Screw Division, and was elected to the board of directors in 1920, and vice president in 1928. He is succeeded as chief engineer by **Joseph M. Schaeffer,** who has served as assistant to Mr. Wilcox for many years.

—o—

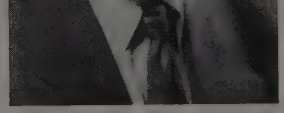
R. O. Butler has been appointed works manager, Empire Steel Corp., Mansfield, O., succeeding **William Lake.** Mr. Butler formerly had been associated with the Steel Co. of Canada, Hamilton, Ont. **George R. Roemer** has been appointed superintendent of maintenance and engineering for the company.

—o—

B. M. Ashbaucher has been appointed manager, mid-continent oil field rope sales, for the American Steel & Wire Co., Cleveland, U. S. Steel subsidiary. In his new position, with headquarters in Dallas, Tex., he will succeed **Edwin T. Eggers,** who has been transferred to the general sales department of the company in Cleveland.

—o—

L. W. Hayden has been named resident vice president of Lindberg Engineering Co., New York. He will be in charge of all east coast sales offices, including Boston, Hartford, Philadelphia, Durham, N. C., and New York. In addition he will be in charge of all export sales. Mr. Hayden, who joined the Lindberg organization in 1935, will continue to maintain headquarters at New York. **G. W. Helsberg,** formerly in New York, is now in charge of the Boston office, and **R. W. Dougherty,** in charge of the Kalamazoo, Mich., office, will be in charge of a new Lindberg office to be opened in Philadelphia. **S. K. Oliver,**



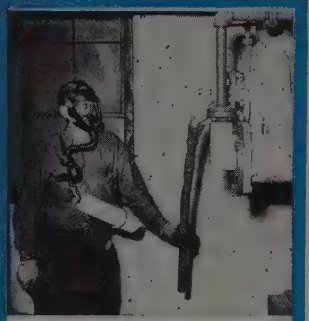
IRVIN PAUL

L. W. HAYDEN

FOR SAFETY IN EVERY BREATHING HAZARD . . . LOOK TO SCOTT!

FOR ECONOMY TOO!

LOWEST OPERATING COST OF ANY BREATHING EQUIPMENT.



SLING-PAK, 6000-B1 OR B3
SELF-CONTAINED

READY INSTANTLY•

FOR INDUSTRIAL EMERGENCIES
FOR INDUSTRIAL MAINTENANCE

For industrial breathing emergencies it's tops; for routine inspection or work in areas containing toxic gases, smoke, fumes, excess heat, or oxygen deficiencies it provides safety, confidence and comfort to your personnel. It's always immediately ready!

ONLY THE SCOTT AIR-PAK

Can be used in any temperature from 20° below zero to oven heat.

Only the Scott delivers fresh, cool, confidence-inspiring air.

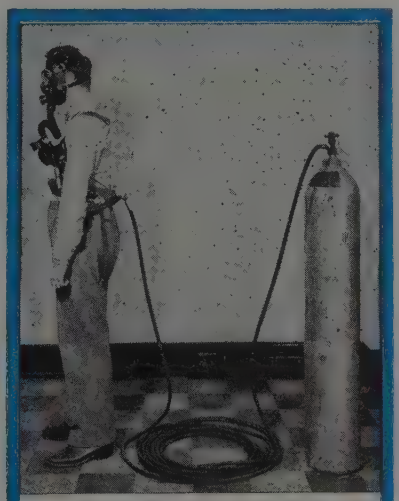
Only the Scott has a gauge on the cylinder to prevent the inadvertent use of empty or partly empty cylinders.

Only the Scott has acid and corrosion proof straps and fittings.

Only the Scott has a battle-tested emergency-proved regulator.

Only the Scott has a gauge within the wearer's vision; custom-built, not a commercial gauge, to provide the maximum in utility and safety.

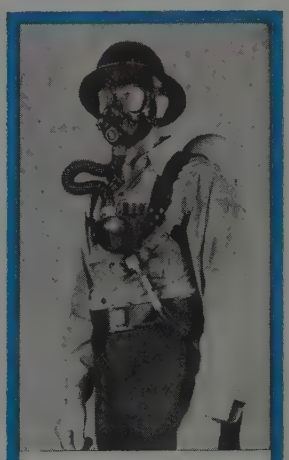
Write for free booklet,
"Which Air-Pak Does Your Plant Need?"



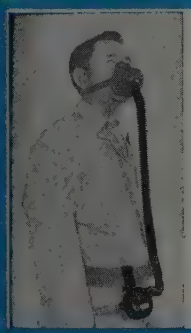
AIR-PAK EXTENSION HOSE ASSEMBLY MODEL NO. 6000-C1, C2, C3, C4 SUPPLYING PURE AIR, THROUGH ARMORED HOSE, UP TO 150 FEET FROM AIR SUPPLY.

COOL, FRESH AIR

The Scott Air-Pak delivers pure breathing air—not oxygen, because pure cool air gives comfort and confidence to the user; and because the use of oxygen adds unnecessary hazards, especially in the presence of petroleum vapors.



BACK-PAK MODEL 6000-A2M
SELF-CONTAINED
BUREAU OF MINES
APPROVAL NO. 1308



THE SCOTT DEMAND - TYPE RESPIRATOR

WILL INCREASE WORKER EFFICIENCY

Because its "demand" air flow is truly comfortable;—no constant flow to dry out nasal and facial tissues. No breathing "against" incoming air pressure, to increase fatigue. Can be used with any half or full-face mask.

WILL SAVE ⅔ OF YOUR AIR COST;

If you now use airline respirators, because The Scott Respirator supplies air only on the inhalation of its wearer;—not a constant wasteful flow. Simply connected to plant air lines, or to commercial cylinders of breathing air.

THE PERFECT RESPIRATOR FOR WELDING, SPRAYING, SAND BLASTING, OR OTHER OPERATIONS IN OBJECTIONABLE, DUSTY, OR IRRITATING ATMOSPHERES.

Write for Free Folder "Scott 6380 Demand Respirator"

SAFETY EQUIPMENT DIVISION

SCOTT AVIATION CORP.

234 ERIE STREET, LANCASTER, NEW YORK

Scott
FOR SAFETY—FOR SERVICE

SOLD BY LEADING SAFETY SUPPLY COMPANIES

formerly in New York, will move to the Cleveland office, and T. M. Crone, formerly connected with General Motors Corp., Detroit, has been placed in charge of the Kalamazoo office.

—o—

D. J. Chapman has been appointed Michigan representative for the Essex Wire Corp., Ft. Wayne, Ind. He will cover the entire state in the interest of magnet wire and wiring assemblies, maintaining headquarters in Detroit. Associated with the company since 1935, for the past five years he has worked in the sales and engineering development of the corporation's assembly business.

—o—

The American Society of Mechanical Engineers has presented the Worcester Reed Warner Medal to **Dr. Arpad L. Nadai** in recognition of his noteworthy contributions to the permanent literature of engineering. Dr. Nadai is consulting engineer of the Research Laboratories, Westinghouse Electric Corp., Pittsburgh.

—o—

W. Harrison Lackey has been appointed district manager of sales for the Pittsburgh district sales office of Lukens Steel Co., and subsidiaries, By-Products Steel Corp. and Lukenweld Inc., Coatesville, Pa. He succeeds **Arthur H. Brown,** who has been appointed district manager of sales for the Coatesville district sales office for Lukens and subsidiaries, and who, in turn, succeeds **W. E. Mullestein,** appointed manager of field sales for the company and subsidiaries.

—o—

David R. Forrest has been appointed assistant to the president of the recently re-organized Cliffs Iron Co., Cleveland. He also will continue to act as office manager.

—o—

Lou Silver, national sales manager of Garod Radio Corp., Brooklyn, N. Y., has been appointed vice president and director of the corporation. He will be in charge of world-wide sales for the firm.

—o—

T. H. Gurney, passenger traffic manager, Chesapeake & Ohio Railway Co., at Richmond, Va., has retired after nearly 44 years of service with the C & O. He is succeeded by **J. C. Ostrom,** assistant passenger traffic manager.

—o—

Charles G. Herbruck has been named assistant secretary of the James F. Lincoln Arc Welding Foundation, Cleveland.

—o—

R. H. Casner has been appointed vice president in charge of procurement for the Flxible Co., Loudonville, O. **J. P. Davey** has been appointed vice president and industrial counsel, and **Walter S. Roach,** vice president and manufacturing controller of the company.

—o—

Waverly A. Reeves has retired from the Aircraft Gas Turbine Division of General Electric Co., Schenectady, N. Y., after 43 years' service with the company. He had been closely associated with the late **Dr. Sanford A. Moss** in the development of the turbosupercharger.

—o—

Mark Neitlich, a recent graduate of Yale University, has joined the staff of Horizons Inc., Princeton, N. J., as a research assistant at the new laboratory of the corporation in Cleveland.

—o—

A. F. Boucher, welding engineer for the Lincoln Electric Co., Cleveland, has been transferred to become district manager for the Milwaukee office. **Marshall Ford** has been made district manager for the company's Minneapolis office.

—o—

Carl C. Langevin has been named a director of W. L. Maxson Corp., New York, and president of the newly organized Langevin Mfg. Corp., maker of sound systems and industrial control equipment. The Langevin Co. has been acquired by Maxson Corp.

—o—

H. Hugh Willis, formerly chief research director and vice president, Sperry Gyroscope Co. Inc., Great Neck, L. I., N. Y., has been appointed director of research and development for Kellex Corp., atomic energy subsidiary of M. W. Kellogg Co., Jersey City, N. J.

—o—

William H. Stanley, associated for nearly 42 years with Fairbanks, Morse & Co., Chicago, has retired as superintendent of the diesel engine department. He is succeeded by **Lon Worthing.**

—o—

George A. Bryant, president of the Austin Co., Cleveland, has been elected a director of the Cleveland Trust Co.

—o—

Dr. Bernard Kopelman has been appointed section head of the metallurgical research group of Sylvania Electric Products Inc., New York. He rejoined the metallurgical research staff of Sylvania after a recent association with the United States Finishing Co., Providence, R. I. He previously had been with Sylvania for two years.

—o—

William F. Weimer, assistant advertising manager of Rockwell Mfg. Co., Pittsburgh, has been appointed advertising manager of the company's Pittsburgh Equitable Meter Division.

—o—

Walter Ramberg has been appointed chief of the Mechanics Division of the National Bureau of Standards, to succeed **Hugh L. Dryden,** who is leaving the Bureau to become director of research for the National Advisory Committee for Aeronautics.

—o—

Victor Samson has been appointed manager of the Detroit sales office of Lamson & Sessions Co., Cleveland, succeeding **Harry La Potterie,** who has retired. Mr. Samson has been associated with the company since 1923, and spent most of that time as a representative of the company in the Detroit area.

—o—

Dr. R. C. Mason has been named manager of the electro-physics department of the Westinghouse Research Laboratories, Westinghouse Electric Corp., Pittsburgh, succeeding **Gaylord W. Penney,** recently appointed Westinghouse professor of electrical engineering at the Carnegie Institute of Technology. Dr. Mason has been on leave of absence at the atomic energy project in Oak Ridge, Tenn., for the past year. **P. T. Lagrone** has been appointed manager, customer section, central station sales department of the corporation.

—o—

Robert Gregg, foundry manager, Reliance Regulator Corp., Alhambra, Calif., has been elected a director of the American Foundrymen's Association.

—o—

Loren E. Boysel, formerly associated with engineering and quality control for the Fisher Body Division of General Motors Corp., Detroit, and active in aviation engineering during the war, has been appointed body engineer at Willys-Overland Motors Inc., Toledo, O.

—o—

Dr. Maxwell Gensamer has been appointed assistant to director of research of Carnegie-Illinois Steel Corp., subsidiary of U. S. Steel Corp., New York. He recently had been professor of metallurgy and head of the department of mineral technology at Pennsylvania State College.

—o—

Kenneth E. Newell, Youngstown Sheet & Tube Co., Youngstown, has been transferred from the Youngstown district sales office to the company's office at Milwaukee. He joined the company a year ago, following service in the Marine Corps during the war.

—o—

H. V. Somerville has been appointed manager of the east-central region of the Victor Division, Radio Corporation of America, wth headquarters at Cleveland.

—o—

John M. Robb Jr., Philadelphia resident manager of Hickman, Williams & Co., Chicago, has been appointed chairman of the General Arrangements Committee for the 1948 convention and exhibit of

DAVID LYLE

Has joined Continental Foundry & Machine Co., East Chicago, Ind., as assistant vice president in charge of engineering. Noted in STEEL, Sept. 8 issue, p. 70

O. L. HOWLAND

Appointed sales manager of the Welding Division, Metal & Thermit Corp., New York, with headquarters in Chicago. Noted in STEEL, Sept. 8 issue, p. 68

R. J. TREMBLAY

Appointed assistant general superintendent, Los Angeles steel plant of Bethlehem Pacific Coast Steel Corp., San Francisco. Noted in STEEL, Sept. 8 issue, p. 70

the American Foundrymen's Association in Philadelphia, May 3-7.

—o—

Robert B. Hastings has been appointed superintendent of openhearth furnaces, and **Philip J. Bartholomew,** assistant openhearth superintendent of the Warren, O., district of Republic Steel Corp., Cleveland.

—o—

John St. Lawrence has retired as assistant manager of the Erie, Pa., Works of the General Electric Co., Schenectady, N. Y. He had been associated with the company for nearly 34 years, and served as assistant manager in the works for 21 years.

—o—

Carl Stugard, formerly field engineer for many years in the New York territory, has been made manager of the Pittsburgh office of Cincinnati Milling & Grinding Machines Inc., Cincinnati, succeeding **Jim McLeod,** who has resigned. **Harold Edwards,** of the company's engineering service department, has been named a field engineer in the territory vacated by Mr. Stugard.

—o—

Samuel Spring, formerly a research specialist for the federal government, has been appointed to the research & development staff of the Pennsylvania Salt Mfg. Co., Philadelphia. He will have charge of the inorganic research group at the company's Whitemarsh Research Laboratories.

—o—

W. Hart Wilson, in charge of container development and industrial packing, Federal Telephone & Radio Corp., Clifton, N. J., announces the opening of industrial offices at 79 Renner Ave., Bloomfield, N. J.

—o—

Titanium Alloy Mfg. Co., Niagara Falls, N. Y., announces the appointment of **N. R. Arant** to its metallurgical field staff. He has had previous experience with Republic Steel Corp., Cleveland, and Universal-Cyclops Steel Corp., Bridgeville, Pa.

—o—

Charles J. Hardy has been elected to the board of directors of Charles Hardy Inc., New York, a metallurgical firm, and **Harold C. Miller** has been named vice president of the company, in charge of engineering.

—o—

Lawrence C. Flickinger has been appointed chief chemist for the Youngstown district of the Youngstown Sheet & Tube Co., Youngstown, succeeding the late **David A. Russell.**

—o—

Frank Riel, foundry superintendent for 20 years with Seneca Falls Machine Co., Seneca Falls, N. Y., has retired.

OBITUARIES

Frederick Martin, 71, for the last 10 years president of the King Fifth Wheel Co., Philadelphia, manufacturer of metal flanges and rings, died recently at Avalon, N. J.

—o—

Joseph F. Ahearn, 63, president and general manager, Universal Instrument & Metal Co., N. Y., died at his home recently.

—o—

Edward C. Bowers, 66, who resigned as president of the Wickwire Spencer Steel Co., New York, in 1943, died Sept. 6 at the Yale Club in that city, where he resided. Wickwire Spencer now is a division of Colorado Fuel & Iron Corp. Mr. Bowers was a member of the company's executive board at the time of his death. He joined Wickwire in 1911.

—o—

Julius F. Brenzinger, 80, inventor and pioneer in the development of the tin can, died Sept. 6 at his home after a short illness. He had been general manager and vice president of the Max Ams Machine Co., Bridgeport, Conn.

—o—

Hiram E. Reed, 78, retired superintendent of the Erie Foundry Co., Erie, Pa., died Sept. 5 following an illness of several weeks.

—o—

Joseph H. O'Brien, 73, consulting engineer and architect, specializing in steel design, died in Yonkers, N. Y., recently.

—o—

Carl A. Weidner, founder and president of the Weidner Tool & Die Co., Rochester, N. Y., died recently. He founded the firm in 1906 and was active in it until his death.

—o—

George K. Conant, 65, president, Sligo Iron Store Co., St. Louis, died Sept. 4 from a heart attack, while he was driving his automobile.

—o—

Robert A. Sindall, 65, president of A. K. Robins & Co., Baltimore, manufacturer of canning machinery, died Sept. 3 at Johns Hopkins Hospital.

—o—

William L. Bayer, 51, president, Canadian Bronze Co. Ltd., Montreal, Canada, and an official in many other corporations, died in Montreal, Sept. 1.

—o—

Wendell F. Hebard, 63, president, W. F. Hebard & Co., Chicago, died Sept. 4 in Evanston, Ill.

By JAY DeEULIS
Associate Editor
STEEL

Special Cutters—

PRECISE FASHIONERS OF COMPLICATED SHAPES

Efforts involved to obtain precision of product and quality in the creation of unusual tools for "carving" vital metal parts into shapes required by today's mechanical world are described here along with some specific tasks performed by these cutters

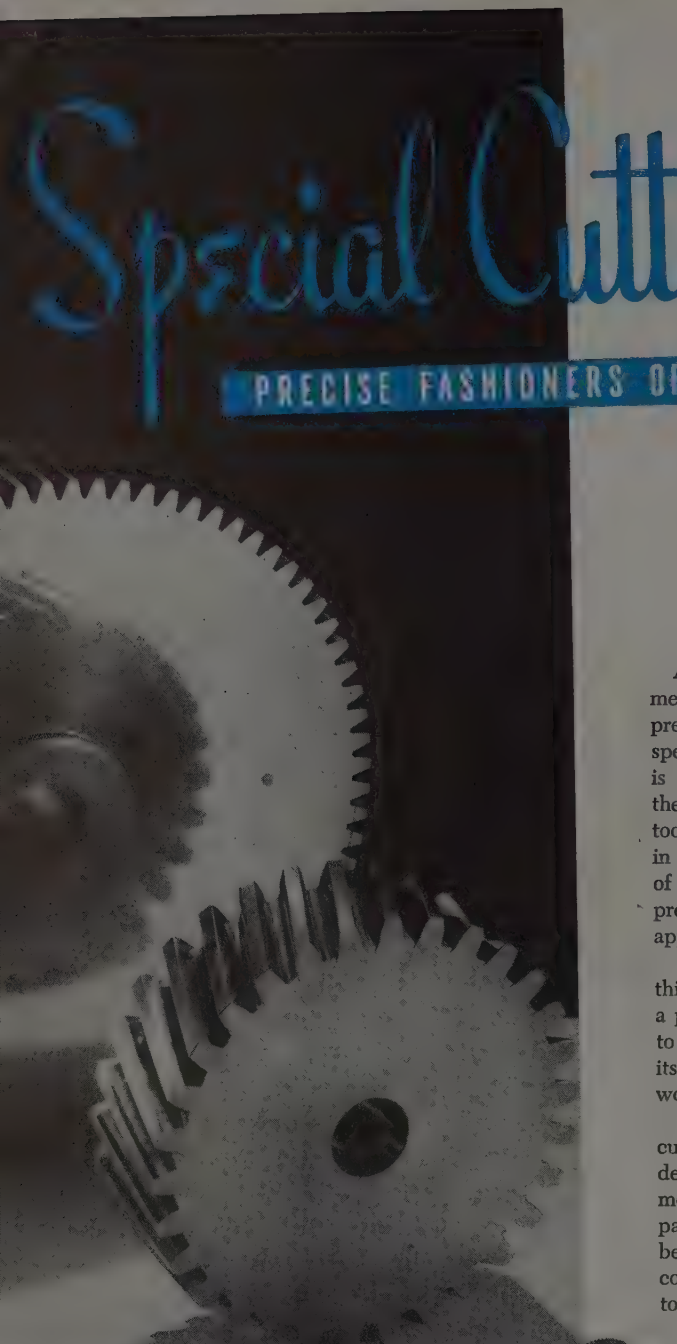


Fig. 1—Three master gears produced by the company. Note high finish provided

AN engineers-eye-view is needed to appraise the many metal products affecting our daily lives, and to fully appreciate the close relationships between steel and the special cutting tools used to form it. Steel, as a metal, is evident everywhere—in the home, on the streets, in the plant and office. Not so evident is the special cutting tool which plays such an important behind-the-scenes-role in shaping the steel as we see it—that former and shaper of metals that plays an indispensable part in creating a precision camera or delicate watch movement, a household appliance or giant earthmoving tractor.

In accomplishing its industrial missions, the shape that this cutter can take is almost without limit for whenever a particular curve, form or contour is desired on the metal to be shaped, it must first be developed in the cutter itself so the latter can impart the desired contour to the work piece.

One of the most familiar uses of special tools is in gear cutting. Since gears are essential in every mechanical device where power is transmitted and translated into motion, it readily can be understood what an important part gears play in industry—how vital gear-cutting tools become. In the steel industry, for example, these cutters come into play even before they are placed in operation to shape the metal. They are employed to cut gears for rolling mills used to roll the steel.

Because these special tools take such a prominent hand in "carving" metals, tool producers strive to obtain precision of product or quality in their cutters, and make every effort to design them for repeated service or long tool life. Materials used in cutter production conform in every respect to customer specifications, even if an extensive search is required to obtain the particular metals needed; design of each cutter is frozen to perform one specified duty and nothing more.

It must be remembered that production costs are reduced not only by the rapidity with which each cutter is operated, but also by its useful life—measured by the number of times it can be resharpened and reused without impair-

Fig. 2—Ground form spline hob and test cut it produced

Fig. 3—Ground form, form relieved cutter

Fig. 4—Ground form multiple start tangential feed worm gear hob

Fig. 5—Modified tooth form of this herringbone gear shaper cutter (a) produces the desired chamfer at the same time that the tooth in the gear is being cut. Solid line in drawing (b) shows cut produced by cutter, while dotted lines indicate portion previously chamfered by filing

Fig. 6 — Interlocking form relieved cutter consisting of five sections for milling impeller blades

Fig. 7—Eighteen-section form relieved cutter for milling ratchet teeth in jacks

Fig. 8—Gang of saws mounted on arbor with spiral keyway

Fig. 9 — Unground form hob—1¼-diametral pitch — compared in size with a 32 diametral pitch unground hob

Fig. 10—Gear shaper finishing cutter used by Caterpillar. It includes 19 teeth and has a diametral pitch of 2.413

Fig. 11—Two views of a 7 diametral pitch gear shaper cutter showing amount of service obtained from these special cutters

ing its original accuracy. Although improved methods of heat treating and choice of materials contribute materially to cutter stamina, the decisive factor in extending cutter life through resharpening is probably the design. It is the design that permits repeated grinding back without changing the precise contour of the cutting edge.

To the special cutting tool industry the production line in the fullest meaning of the term, is something entirely foreign. The process of turning out special cutting tools and broaches is special from the time each order reaches the plant until it is created and shipped to the customer in its usable shape. In fact, "special cutting tools are made on special machinery by specialists". At National Tool Co., Cleveland, for example, 100 per cent of its production consists of "specials". Here, the only departments that may come close to production line methods are the hob and gear shaper cutter sections where the cutters, in taking shape, never are carried out of their respective departments except for heat treating. At that, the term "production" is loosely applied when it is considered that an order for 10 to 15 hobs or gear shaper cutters is classified as a large one. It is true that special tool producers have received, and occasionally obtain orders that call for anywhere from 500 to 1000 cutters of one kind; however such orders are very rare.

To turn out special cutting tools, which may be in form of a gear shaper cutter as fine as 100 diametral pitch to 1 diametral pitch, a special flat or sectional broach, a form relieved milling cutter or some other special job, each tool producer, of necessity, must support in its organization a high powered engineering staff versed in all phases of special tool creation. Each must have heat treating, metallurgical and research specialists along with skilled inspection personnel capable of keeping a police-like vigil over the organization's many mechanical operations—to spot in the latter any minute deviations from specifications which may lead to costly errors.

In line with such an organization, National Tool maintains an engineering, standards, heat treating, metallurgy and inspection department, in addition to its various "production" departments. It also supports a machine shop for added flexibility in creating extraordinary metal cutters. Principally, it exists to build special machines required to process tools never produced previously—machines that never have appeared on any company's drawing boards. The machine shop, for example, enables the tool concern to build its own hob, involute grinders and checkers, pressure angle and lead checkers—many of which are in use today. Although part of the organization, and seemingly a luxury department, the shop is entirely self-supporting. It is made to pay its own way by taking on subcontract work for other firms in or out of the city.

Most all special tool makers operate more or less along the same lines in handling orders and processing newly-designed cutters through the various production stages. At National Tool, orders for special tools are received in almost any form. They may be called in by phone, if not complicated; or appear in shape of a blueprint of the part to be reproduced furnished by the customer. Often the part to be shaped is (*Please turn to Page* 126)

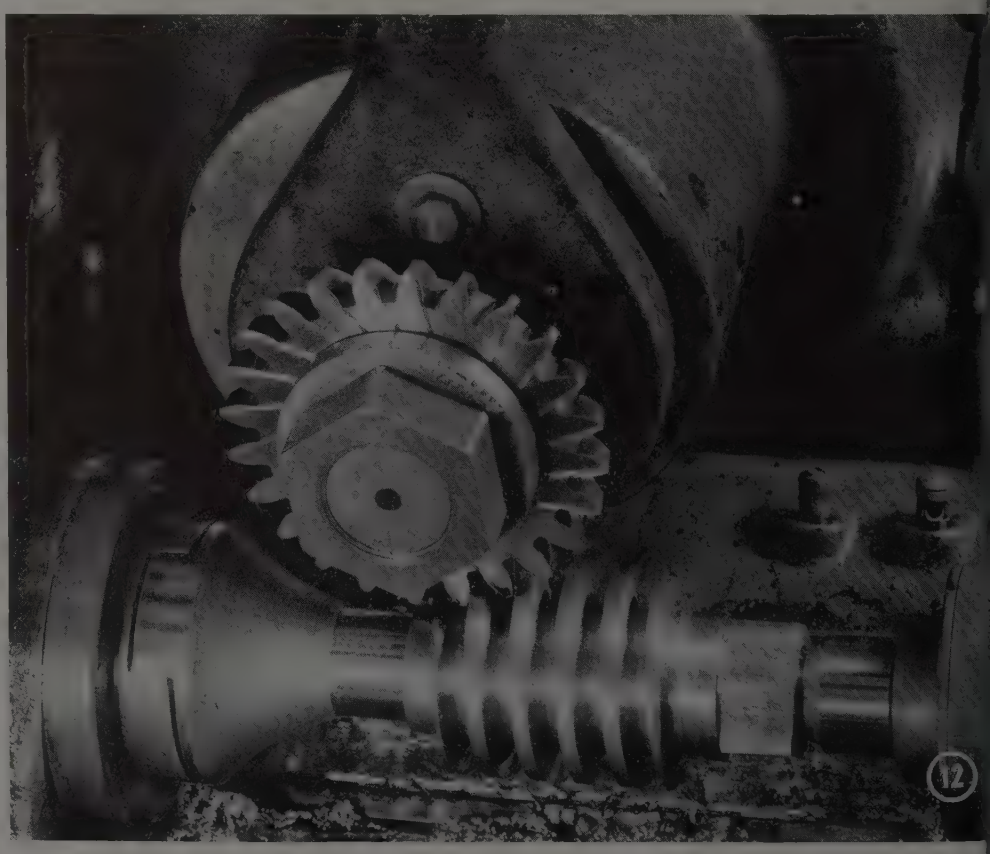


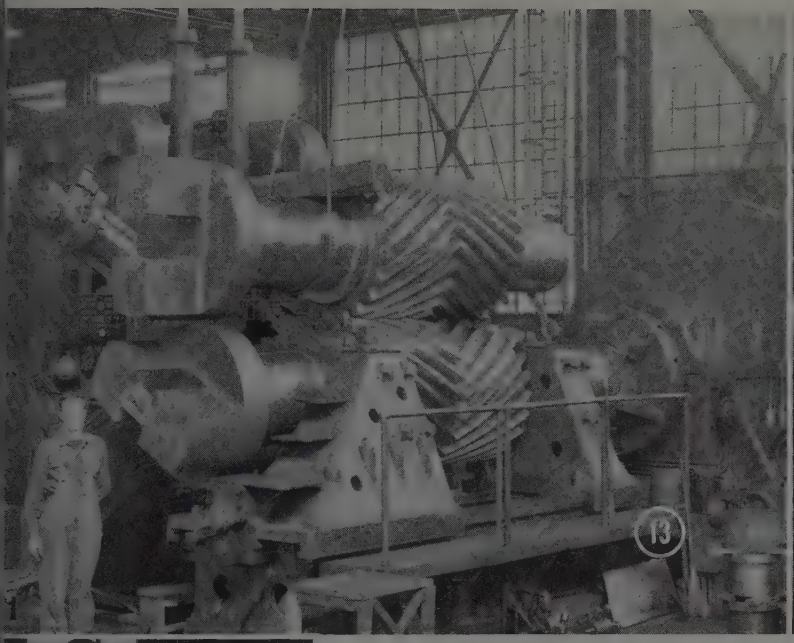
Fig. 12 — *Worm generator cutter in operation at plant of Ohio Gear Co.*

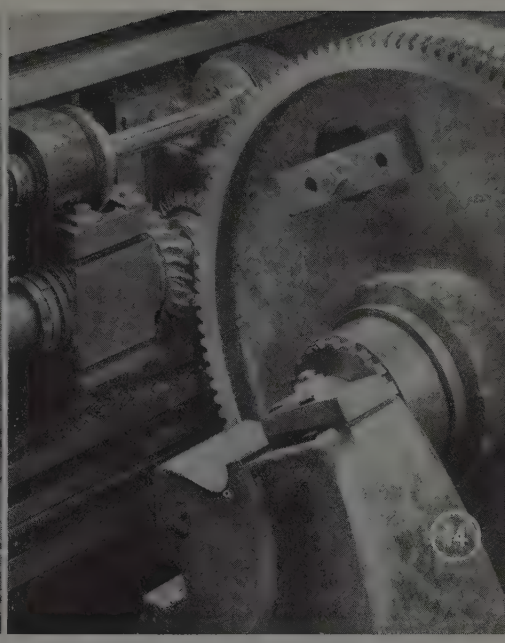
Fig. 13—*Giant herringbone gear being generated by a planer type tool. Lower pinion here is in cutting position with second pinion laid on top. Photo courtesy Dominion Engineering Works Ltd., Montreal*

Fig. 14—*View of a herringbone gear shaper cutter creating a herringbone gear*

Fig. 15 — *Broach assembly, surface type, with holder*

Fig. 16—*Typical "production - sequence" chart issued by the standards department for processing special tools*





DATE 7-9-47 PROMISED DATE _____ INQUIRY NO. DE-4h TOOL CLASS 326

TOOL NAME GROUND FORM SPUR GEAR HOB SHELL TYPE

MATERIAL: KIND 4-1 forging SIZE 3 1/8 x 3 1/8 OH

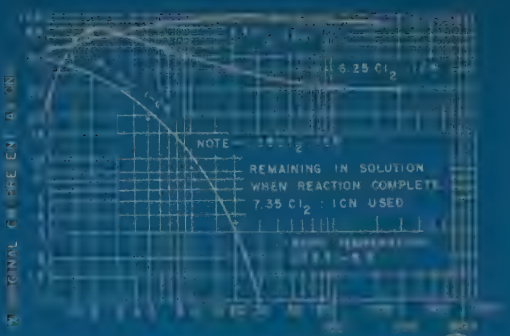
LENGTH _____ NO. PCS. 1 UNIT PRICE _____ AMOUNT

DWG. NO. 26-3962 CUSTOMER John Doe Co. S.O. NO. 69-7100

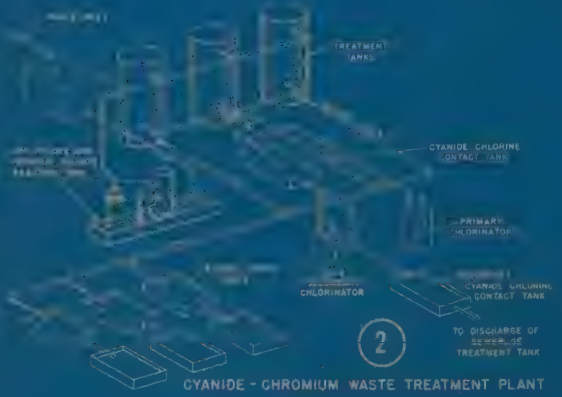
DEPT. & GROUP	OPER.	STD. TIME			OPERATION NAME	MACHINE OR WORK PLACE
		TOTAL SET-UP	PIECE OPER.	TOTAL		
24	5				issue forging	
11A	10	20.0	20.0		face 1 side, drill, ream, recess and chamfer hole	
11A	15	16.0	25.0		fin. face, turn OD, form hubs, chamfer and stamp ident.	
27	20				inspect	
11A	25	20.0	31.0		mill threads	
11A	30	32.0	20.0		mill gashes	
11A	35	10.0	5.0		broach keyway	
11A	40		2.5		file	
27	45				inspect	
12	50				heat treat process "E"	
27	55				test for hardness	
11C	60		3.0		clean hole	
11C	65	3.0	3.0		rough face grind	
11B	70	54.0	80.0		rough form relieve	
11B	75		50.0		finish form relieve	
11B	80		30.0		relieve double cam	
27	85				inspect	
11A	90	10.0	6.0		remove partial teeth	
11A	95		4.0		file	
27	100				inspect	
12	105				harden	
27	110				test for hardness	
11C	115	20.0	8.0		grind hole	
11C	120	5.0	5.0		lap hole	
11C	125	11.0	12.0		face ends and grind hubs	
27	130				inspect	
27	135				etch	
11C	140	5.0	12.0		sharpen	
11D	145	60.0	15.0		topping	
11D	150	12.0	20.0		rough grind 1st side	
11D	155		25.0		finish grind 1st side	
11D	160	12.0	20.0		rough grind 2nd side	
11D	165		30.0		finish grind 2nd side	
11D	170	10.0	15.0		grind radius 1st side	
11D	175	10.0	15.0		grind radius 2nd side	
27	180				inspect	
19	185				ship	

16

Treating



REACTION TIME IN MINUTES (1)

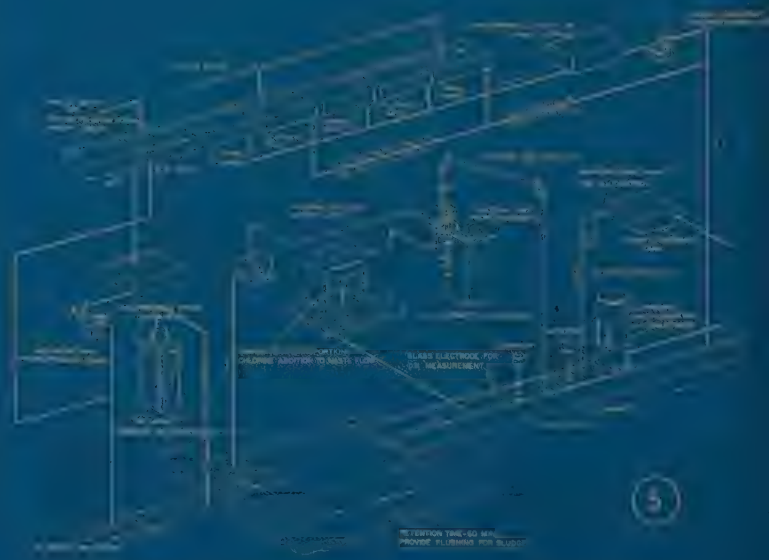


(2)

CYANIDE - CHROMIUM WASTE TREATMENT PLANT

(3)

SCHEMATIC LAYOUT - TREATMENT PLANT
CYANIDE WASTES (4)



(5)

SCHEMATIC LAYOUT - CONTINUOUS TREATMENT PLANT - CYANIDE WASTES.

Alkaline chlorination of cyanide waste from metal treating and plating operations is now a proved process, having been verified by extensive laboratory tests and several plant installations

Cyanide Waste

FROM METALWORKING PLANTS

USE of chlorine for oxidation of the toxic cyanide radical in cyanide waste from metalworking plants, to form cyanates of carbon dioxide and various oxides of nitrogen is now a proved process. This has been verified by extensive laboratory tests and several plant installations over a period of years.

According to John G. Dobson, Wallace & Tiernan Co. Inc., Newark, N. J., speaking before the Third Industrial Waste Conference held recently at Purdue University, successful application of this method of waste disposal is the result of the cumulative efforts of a number of individuals and plants interested in developing a satisfactory method for treating cyanide waste from metal treating and plating operations.

While cyanide compounds are widely used in industry, five processes are reported to be the source of most of the cyanide waste that causes stream pollution and present problems in sewage plant operation. The processes are:

1. Plating of metal parts
2. Case hardening of steel
3. Neutralizing of acid "pickle scum"
4. Refining of gold and silver ores
5. Scrubbing of blast furnace and producer gas furnace gases.

Each of these processes may have many variations both in design of equipment and method of operation. For this reason, it is imperative that the particular plant in question be carefully studied before the design of waste treatment facilities is begun. It was pointed out by Mr. Dobson that accurate estimates or measurements must always be made of flow and rate of the change of flow, concentration and rate of change of concentration of cyanide, as well as details concerning other wastes that must be treated.

Metal Plating Waste: Waste from typical metal plating operations consists in general of dilute solutions of various plating baths. Concentration of each constituent will vary with "dragout" or amount of solution carried out with the metal being plated, and also, with volume of rinse water being used. Dragout will vary with speed with which work is transferred from one bath to another, and with size and shape of work. Naturally, irregular and cup-shaped pieces carry more solution to rinse water than do flat surfaces.

First step in plating consists of removing adherent oils and greases, usually done by solvent degreasing and alkaline cleaning, and oxide coatings, by an appropriate acid pickling operation. In waste plant design, it was recommended that waste pickle acids should, if possible, be segregated and neutralized separately, whereas rinse waters from alkaline cleaners should be mixed with cyanide waste.

Work is generally carried from the cleaning process to a "strike" solution containing high free cyanide concentration and low metal content where the first adherent coat of metal is deposited, and then to the plating solution itself. Copper, zinc, cadmium, brass, gold and silver are metals commonly plated from cyanide solutions.

In addition to dragout, baths themselves are occasionally dumped and fresh solutions made up. Thus, in cases of waste plant design, some provision should be made in the treatment plant to handle the concentrated dump solution so as to prevent sudden influx of high concentration cyanides. (*Please turn to Page* 112)

Fig. 1—For a potassium cyanide solution of 50 ppm initial cyanide concentration in a boric acid-sodium hydroxide buffer, rate and completion of chorine treatment reaction is shown here

Fig. 2—Schematic layout of unit for handling 50,000 gallons per day of wastes from metal plating and other finishing operations including anodizing

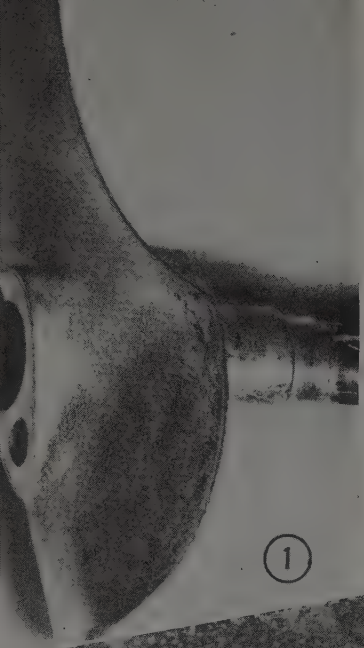
Fig. 3—Type of equipment used for commercial chlorinations

Fig. 4—Simplest type of cyanide waste treatment system applicable to small industrial plants

Fig. 5—Schematic layout of setup for continuous treatment of cyanide wastes from large industrial plants

AN ANALYSIS OF SURFACE

By A. W. SUNDWICK
Research Engineer
Fisher Body—Ternstedt Division
General Motors Corp.
Detroit



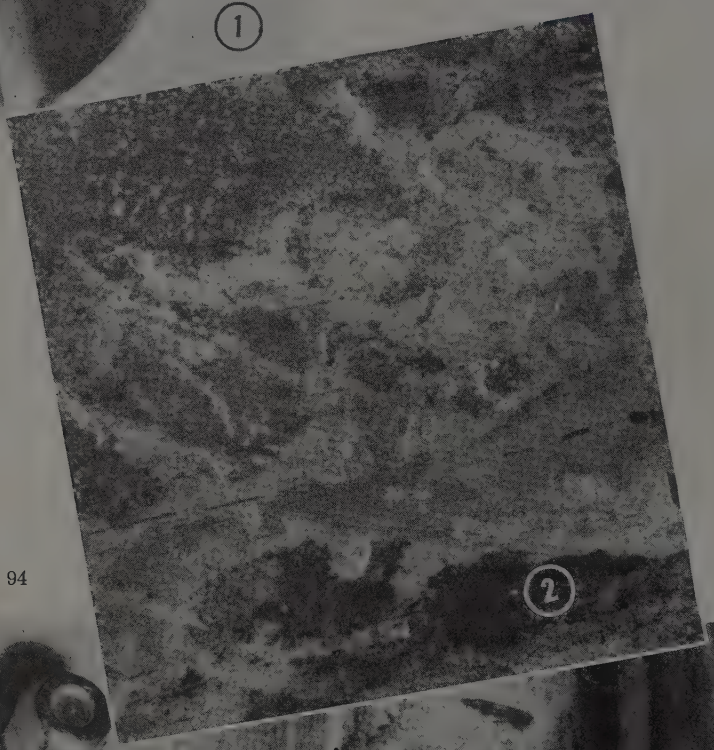


Fig. 1—Chills are characterized by generally shiny surface appearance

Fig. 2—When examined under suitable magnification, a chill is found to be an area of small cold-laps and holes

Fig. 3—Another surface defect is caused by splashing metal particles against walls of the cavity

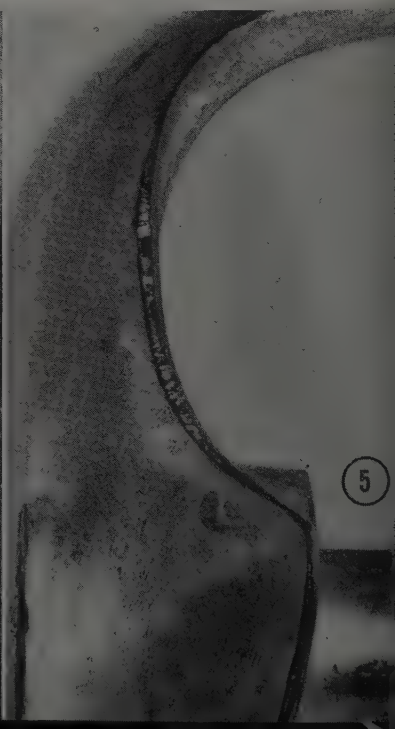
Fig. 4—In the case of splashing, surface is mottled with bright spots of irregular shape and size

Fig. 5—Gate-holes are caused by porosity at gate opening

Fig. 6—Cold-laps occur when two bodies of metal meet after having cooled to such a degree that it is not possible to make them mix intimately

Fig. 7—A swirl is essentially a cold-lap

Fig. 8—When fine particles of molten alloy are sprayed into the cavity at high speeds and strike a section of the cavity wall where there is little or no wash by the main stream of metal a surface defect known as soldering or fusing will occur



Here the author discusses causes of various surface imperfections such as chills, splashing, gate-holes, cold-laps, soldering and swirls as they are influenced by die design and by variations in alloy composition

QUALITY OF ZINC BASE DIE CASTINGS

QUALITY of the surface of zinc base die castings is influenced by quality of zinc alloy used, design of the die, and construction and maintenance of the casting machine. Very frequently, efforts at determining cause of specific, troublesome surface defects on die castings resolve into a debate between those who feel that the metal itself is at fault and those who feel that the trouble is caused by faulty die design.

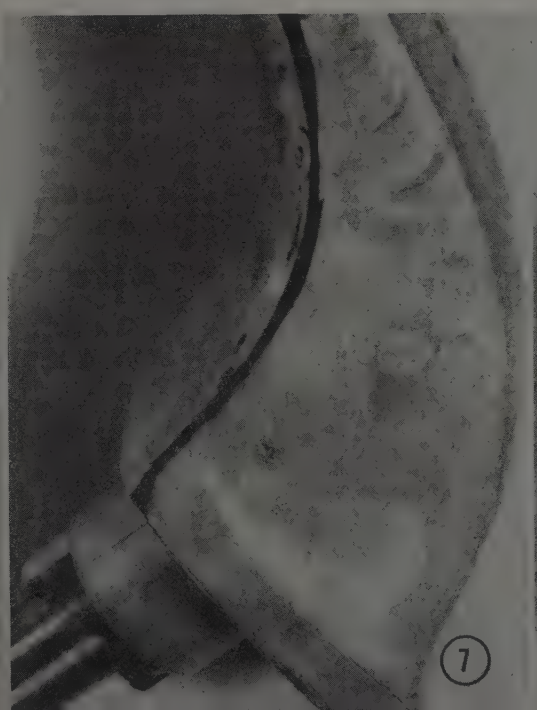
In an effort to determine the reasons for poor surface quality, a number of zinc alloy die castings which showed various surface imperfections were studied in relation to the size, shape and location of their gates and runners. All of the castings examined were reasonably of the same composition, that is, within specification limits for ASTM-Alloy XXV., and were cast in the same standard goose-neck-plunger type die casting machine.

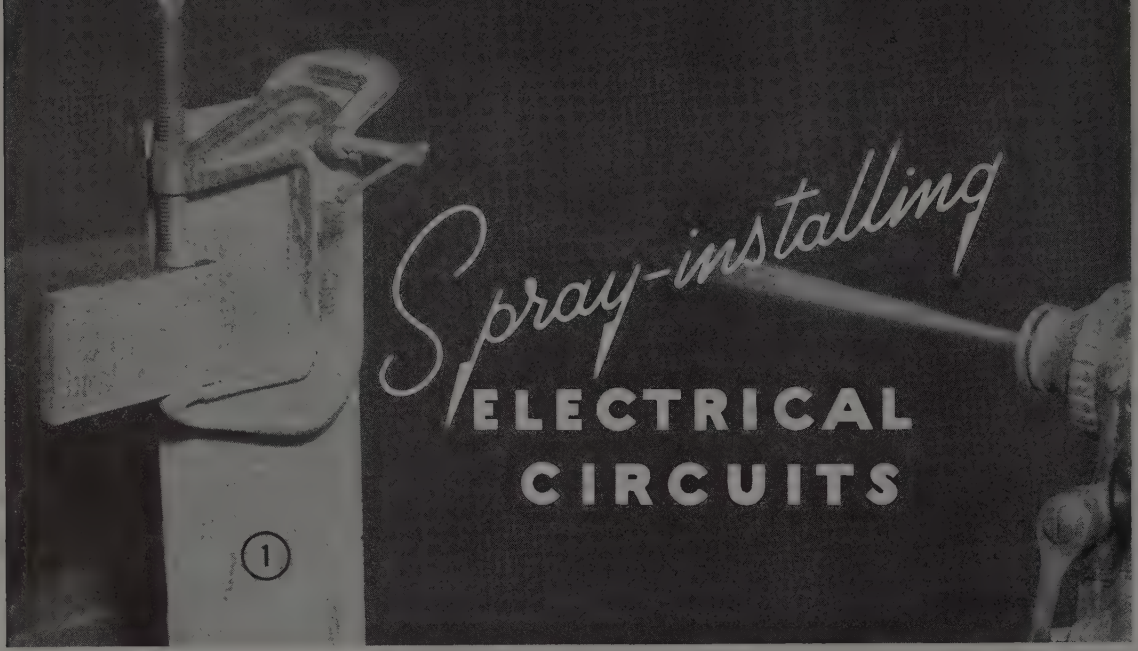
Radiographs showed that though there were appreciable differences in the amount and distribution of porosity there was no strict correlation between the amount of porosity in a casting and its surface appearance. In other words, perfectly solid castings were found to have about same types, quantity of surface defects as porous castings.

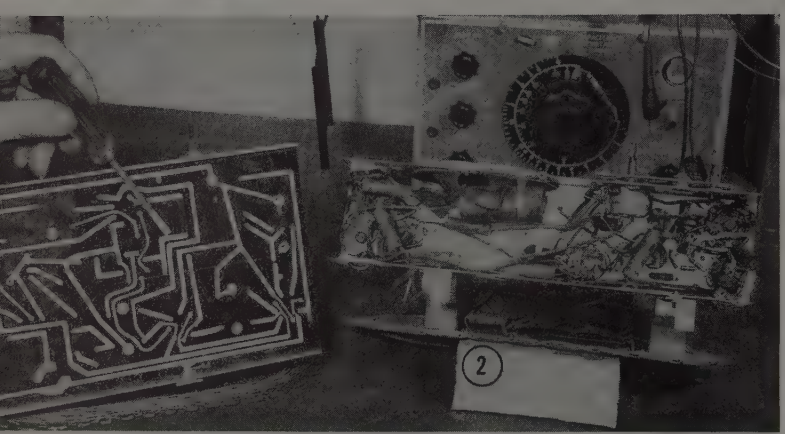
One of the more common causes of poor surface condition is the "chill". This defect is characterized by its generally shiny appearance which, when examined under suitable magnification, is found to be an area of small cold-laps and holes, Figs. 1 and 2. Indications are that the metal was not under sufficient pressure to force it into solid contact with the cavity wall while yet plastic enough to assume perfectly the outline of the cavity surface. Surface appearance of the casting, that is, was influenced to a large degree by the surface tension of the metal.

A chill may occur when the die or the metal is below the optimum operating temperature, when insufficient pressure is applied or when there is a delay in the application of pressure after a cavity is filled or partially filled.

When solidification does not progress uniformly and simultaneously in all parts of the cavity the final pressure will not be transmitted uniformly to all parts of the cavity. For this reason there may be areas of insufficient pressure even when the overall pressure is greater than would normally be considered (*Please turn to Page* 136)







By means of a spraying process, conventional wire—fed into guns—is converted into flat conductive strips embedded in dielectric panels. Sprayed metal forms entire basic wiring of chassis in single operation

By JOHN T. COLLIER
Spraywire Laboratories Inc.
Minneapolis

Fig. 1—Spraying an experimental panel. In a similar production setup all handling is automatic. Photos, Figs. 1 and 2, courtesy Minnesota Mining & Mfg Co.

Fig. 2—Spraywire radio chassis, left, and conventional chassis right. Sprayed circuits are imbedded in one side of panel and components attached to opposite side in this particular model

Fig. 3—At left is small amplifier panel with stencil applied, prior to sandblasting or metallizing. Note inserted eyelets. Center panel is metallized, but stencil is not removed. At right is completed panel after stencil is removed

ELIMINATION of hand wiring in mass production of electrical circuits has been made practical by the application of metallizing techniques to the spraying of electrical conductors. In this spraying process, conventional wire fed into metallizing spray guns is converted into flat conductive strips actually imbedded in dielectric panels. Metal sprayed directly on a panel through apertures in a stencil forms the entire basic wiring of the chassis in a single operation.

Spraying molten atomized metal has long been a familiar practice in the field of maintenance, wherein worn metal bearing surfaces are restored to original dimensions and surfaces subject to corrosion are sprayed with protective coatings of such metals as zinc or aluminum. In recent years this technique (the Shoop process) has come into broader use in production as well as in maintenance, and its more recent application to the production of electrical circuits provides an efficient new tool to electrical manufacturers.

Metals generally sprayed for electrical conductors are among the 42 alloys available for use with metallizing equipment. These include copper, silver, Nichrome (for heating unit resistors, etc.), (*Please turn to Page* 110)

FORTIETH ANNUAL CONVENTION

. . . to be held in Pittsburgh

PITTSBURGH, the city where its first annual meeting was held 40 years ago, is to be the scene of this year's annual convention of the Association of Iron and Steel Engineers. The 4-day meeting, beginning Mon., Sept. 22, is scheduled to continue through Sept. 25. All events are to be confined to the William Penn Hotel.

This year's convention marks the first exposition-less meeting under the new every-other-year schedule recently inaugurated by AISE board of directors. Policy of advancing technical and engineering phases of the production and processing of iron and steel is to be continued at this meeting. On the program are included two electrical sessions, three sessions on combustion, one rolling mill and mechanical session, two on operating practice and two each on standardization and lubrication. In addition, an inspection trip is scheduled to enable members to examine the new facilities at Homestead Works, Carnegie-Illinois Steel Corp.

Registration of members and guests begins at 9 a. m. in the Silver Room of the hotel. Ladies registration is at the same hour in Parlors E and F.

Presiding over the program will be L. R. Milburn, president of AISE, and electrical engineer at Great Lakes Steel Corp., Ecorse, Mich.

Monday, Sept. 22

9 a.m.—Registration—Silver Room

9 a.m.—Ladies' Registration — Parlors E and F

9:15 a.m.—Business Meeting—Urban Room Conducted by President L. R. Milburn

9:30 a.m.—Electrical Session—Urban Room

Chairmen: I. N. Tull, Republic Steel Corp., H. L. Coe, Carnegie-Illinois Steel Corp.

"Twin Motor Drives for Tandam Cold Strip Mills", by R. H. Wright, Westinghouse Electric Corp.

"Operation and Maintenance of Variable Voltage Control Systems", by A. D. Howry, Alan Wood Steel Co.

"Improved Reversing Mill D-C Generators", by C. Lynn, Westinghouse Electric Corp., and Walter H. Burr, Lukens Steel Co.

2 p.m.—Rolling Mill Session—Urban Room

Chairmen: A. G. Ericson, Carnegie-Illinois Steel Corp.; Louis Moses, Bethlehem Steel Co.

"The Y-Mill—A New Type of Cold Strip Mill", by A. B. Montgomery and W. M. McConnell, Mackintosh-Hemphill Co.

"Factors in the Operation of a Mannesmann Piercing Mill", by H. R. McLaren, Timken Roller Bearing Co.

"Applications of the Basic Principle of Rolling in Roll Design", by Ross E. Beynon, Carnegie-Illinois Steel Corp.

2 p.m.—Operating Practice Session—Cardinal Room

Chairmen: J. H. Vohr, Carnegie-Illinois Steel Corp.; R. P. Tooke, American Rolling Mill Co.

"Job Evaluation", by L. H. Brown, Wheeling Steel Corp.

"New Technique in Conditioning Stainless Steel", by A. E. Hamilton, Jr., Hamilton Pump Co. Inc.

"The Powder Process in Stainless Steel Production", by C. J. Burch and E. M. Holub, The Linde Air Products Co.

Tuesday, Sept. 23

9 a.m.—Combustion Session—Cardinal Room

Chairmen: C. J. Wyrough, Jones and Laughlin Steel Corp.; C. E. Duffy, Bethlehem Steel Co.

"Uses of Oxygen in Steel Production", by J. H. Zimmerman, The Linde Air Products Co.

"Oxygen in the Open Hearth", by E. C. McDonald, Republic Steel Corp.

"Agitation of the Open Hearth Bath with Oxygen and Compressed Air", by J. N. Hornak, Carnegie-Illinois Steel Corp.

9 a.m.—Standardization Session—Urban Room

Chairmen: F. W. Cramer, Carnegie-Illinois Steel Corp.; V. E. Schlossberg, Inland Steel Co.

Standardization Committee Report—F. W. Cramer, chairman, AISE standardization committee.

Final report of direct current mill motor committee.

Reports on operational experience with new direct current mill motor.

Effect of proposed new AISE mill motors on motor brake design.

Report of committee on standardization of safety switches.

Report of committee on standards for surface finish.

2 p.m.—Combustion Session—Cardinal Room

Chairmen: C. W. Bruce, Republic Steel Corp.; B. B. Bargman, Carnegie-Illinois Steel Corp.

"Oxygen and the Steel Industry", by Harry W. McQuaid and F. E. Pavlis, Air Products Inc.

"Steam Generation and Maintenance of Power Stations for Steel Plants", by John J. Alexander, Republic Steel Corp.

"Auxiliary Fuels in Gas Fired Steam Units", by A. R. Mumford, Combustion Engineering Co. Inc.

2 p.m.—Electrical Session — Urban Room

Chairmen: M. B. Antrim, Lukens Steel Co.; D. C. Nelson, Jones and Laughlin Steel Corp.

"Electric Heating of Steel Strip for Con-

tinuous Processing", by A. R. Ryan and F. E. Ackley, General Electric Co.
"Trends in Lifting Magnet Design and Applications", by John D. Leitch, Electric Controller & Mfg. Co.
"Glass Fiber Electrical Insulating Materials", by Harry O. Collis, Owens-Corning Fiberglas Corp.

Wednesday, Sept. 24

9 a.m.—Inspection Trip—New Facilities at Homestead Works, Carnegie-Illinois Steel Corp.

2 p.m.—Lubrication Session—Cardinal Room

Chairmen: C. R. Hand, Bethlehem Steel Co.; D. N. Evans, Inland Steel Co.
"Industrial Uses of Synthetic Lubricants", by W. H. Millett, Carbide & Carbon Chemicals Corp.
"Rolling Lubricants for Cold Mills", by R. J. Nekervis and R. M. Evans, Battelle Memorial Institute.
"Barium Lubricating Grease", by C. J. Boner, Battenfeld Grease & Oil Corp.

2 p.m.—Standardization Session—Urban Room

Chairmen: F. W. Cramer, Carnegie-Illinois Steel Corp.; E. L. Anderson, Bethlehem Steel Co.
"Proposed New Crane Specifications", by I. E. Madsen, Association of Iron and Steel Engineers.
"Report on Crane Bridge Drive Specifications", by Marc de Ferranti, General Electric Co.
"Research Report on Design of Crane Ladle Hooks", by Professor C. W. Muhlenbruch, Carnegie Institute of Technology.
"Research Report on Design of Hot Metal Ladles", by K. Knudsen, W. Munse and B. Johnston, Fritz Engineering Laboratory, Lehigh University.
Report of AISE sling and crane chains standards committee.

7:30 p.m.—Formal Dinner-Dance—Ball Room

Speaker: C. R. Cox, president, Carnegie-Illinois Steel Corp.

Thursday, Sept. 25

9 a.m.—Mechanical Session—Urban Room

Chairmen: H. W. Neblett, Inland Steel Co.; T. R. Moxley, Wheeling Steel Corp.
"Metals in Service", by P. M. Hess, Safe Harbor Water Power Corp.
"Principles of Job Scheduling in a Machine Shop", by L. E. Fuller Jr., Carnegie-Illinois Steel Corp.
"Effects of Shot Peening and Cold Rolling on the Characteristics of Steel", by O. J. Horger, Timken Roller Bearing Co.

9 a.m.—Operating Practice Session—Cardinal Room

Chairmen: C. P. Betz, Hanna Furnace Division, Great Lakes Steel Corp.; J. L. Tatman, Wheeling Steel Corp.
"Preparation of Coal for Coke Production", by Preston E. Jordan, Wheeling Steel Corp.
"Coke Oven Machinery", by Ragnar Berg, Koppers Co. Inc.
"Progress of High Top Pressure Operation of Pig Iron Blast Furnaces", by B. S. Old, E. L. Pepper and E. R. Poor, Arthur D. Little Co.

2 p.m.—Lubrication Session—Cardinal Room

Chairmen: C. E. Pritchard, Republic Steel Corp.; R. S. Shoemaker, American Rolling Mill Co.
"Lubrication of Rolling Mills", by L. E. Lovitt, Socony-Vacuum Oil Co.
"Some Aspects of Lubrication Equipment Maintenance", by Robert A. Kraus, Republic Steel Corp.
"An Improved Method for Mounting Bearings and Couplings", by A. Stewart Murray, SKF Industries Inc.

2 p.m.—Combustion Session—Urban Room

Chairmen: H. S. Hall, Lukens Steel Co.; C. M. Yaeger, Jones & Laughlin Steel Corp.
"Soaking Pits at Middletown American Rolling Mill Company", by H. V. Flagg, American Rolling Mill Co.
"Multiple Fuel Burners for Open Hearth Furnaces", by J. M. Brashear, Inland Steel Co.
"Design and Performance of an Air Recuperator", by E. G. Smith, Amsler Morton Corp.

Chemical Comparisons Speeded by X-Ray

Chemical comparisons may be made economically and rapidly by an instrument known as the x-ray photometer, according to its manufacturer, General Electric Co., Schenectady, N. Y. With it it has been found possible to determine the tetraethyl lead content of gasoline, the concentration of an acid in water, the per cent chlorination of a plastic or the per cent ash in coal. These determinations are made by measuring and comparing the x-ray absorption of a sample and a reference.

The x-ray photometer will work satisfactorily up to a speed of 6 samples per hour in actual operation. In most cases the limiting factor is the time required to prepare the samples. Liquids, which must be measured as they are put into the analyzer cell, require more time than solids when the latter are specimens of uniform thickness. Powdered solids such as coal, which must be weighed into the analyzer cell, require more time than liquids. It is possible, however, to prepare samples independently of the operation of the instrument, GE states.

An advantage of this method of comparison is that it is independent of the physical state of the substance being tested, because the amount of x-ray absorption by a given mass of material is always the same. This is true whether the material is hot or cold, gaseous, liquid or solid. Furthermore, because x-ray absorption is an atomic property, measurements will be identical when an element is alone and when it is in chemical combination.

Charts Aid in Analysis of Handling Problems

"The key to materials handling problems is analysis. Too often problems are solved by snap judgments. Such a solution is sheer guess work and may well lead to costly errors," states R. W. Mallick, assistant to director of Headquarters Manufacturing Engineering Department of Westinghouse Electric Corp., Pittsburgh. To help eliminate this kind of decision the materials handling engineers of the Westinghouse headquarters staff made a study of the problem in consultation with equipment makers.

Result of the work was the formulation of three standard forms for use in making analyses where materials handling is involved. First form is the single item materials handling questionnaire which contains the questions that apply when a single item of material must be moved. This form does not cover every condition, but it is sufficiently general in scope to permit the analyst to grasp the complexity of the problem, Mallick stated. When all questions are answered and any other obvious data are included under remarks, a basis for solving the problem is at hand.

Material handling analysis form is more detailed and intended to cover a complete analysis. By its use a single item may be followed through an entire sequence of operations. Also, any number of items may be charted on this form, resulting in a complete analysis for plant or product.

Last form, the composite chart, shows types and classifications of materials handling equipment and is referred to after the data are collected in the analysis. The materials handling engineer can consult the chart and quickly determine what equipment is available for each type of handling operation, enabling him either to specify his requirements or call in the representative handling the type of equipment that has been found to best fill the plant's needs.

A BOLT FROM THE BLUE

means something unexpected. To the average man, atomic bombs, radar messages to the moon, jet planes and buzz bombs were bolts from the blue. On the other hand, there's nothing unexpected about the performance of CHANDLER cold wrought products. They always meet specifications in tightness, smoothness, strength, closeness and tolerance. Because we do only one type of work—cold wrought products—we do it extremely well, by hewing to accuracy, precision and service.

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Engineering News *at a Glance*

SHIELDED CHARGING TRUCKS: Safe, time-saving means of charging heat treating ovens with castings was provided in the plant of John Deere Co., Waterloo, Iowa, by equipping a standard Towmotor fork truck with a large heat-resistant glass shield, a double set of forks and a pair of tire guards. Shield attachment, which measures about 40 inches square, includes a blue-colored glass that protects the operator's eyes. Tire guards extend down over the front wheels to provide similar protection against the furnace heat. The two sets of forks, one positioned 25 inches above the other, enable an operator to pick up two separate containers of castings simultaneously and place them on separate shelves provided for them in the furnace.

CORRECTS SIGHTING LOCATIONS: Former hit-and-miss methods for defining correct positions, such as height and angularity of a sighting element are replaced by a nomograph developed by Brown Instrument Co., Philadelphia. According to the company, original pupose of the nomograph was to provide a simplified means of correctly positioning its Radiamatic radiation detector to sight on the top course of checker-brick regenerative furnaces. Further developed, it now gives speedy corrections of sighting angles and locations that favorably affect fuel economy.

BIG PIPE JOB: To provide the 20,000,000 gallons of water required daily by Kodak Park, Eastman Kodak Co., Rochester, N. Y., maintains its own water plant and special purification unit on the shore of Lake Ontario. A new suction pipe more than a mile in length and 58 inches diameter was recently installed to meet even greater demands for fresh water.

HOPPER-FED MILLING: Rapid automatic hopper-fed milling process for small round pieces in the plant of Fairchild Camera & Instrument Corp., Jamaica, N. Y., is speeding production 10 to 15 times. In the setup, a hopper feed fixture, designed by William Umscheid of the company's tool design department, is attached to a miller, and is syncronized with actions of an air vise and valve. Operator pours small parts into the hopper which positions them correctly for milling. As the hopper rotates, single parts drop into a chute which feeds them automatically into an air vise. With the vise loaded, an air valve-controlled cam mechanism, mounted at the side of the milling table, controls movement of table automatically. After part is cut, a blast of air blows it into a second chute leading to a container. Fixture can be used for any type milling operation involving one cut or a double one. Besides speeding production, the hopper inspects milling pieces, rejecting those oversize.

BELTING BY THE YARD: Plant engineers and other users now can buy open end V-belting by the foot or yard in much the same manner as their wives purchase ribbon and dry goods through a method of merchandising developed by Goodyear Tire & Rubber Co., Akron. Using special fasteners to splice the open ends, belts can be formed to proper size for emergency use and special adaption. They can be applied as endless belting without dismantling equipment.

LABORATORY PILOT PLANT: Design and process controls of commercial units for chemical, food and process industries now can be predetermined by a new research tool—a pilot plant incorporated in the laboratory of Buflovak Equipment Division of Blaw-Knox Co., Buffalo. With it, the company can study any material that might be affected by metal contamination. Various gages of the stainless steel plant show conditions prevailing within and permit studies of thermodynamics encountered in evaporation processing.

RAPID CALIBRATION: New thermometric standard utilizing freezing point of benzoic acid as a fixed temperature was developed recently by the National Bureau of Standards, Washington, and is being made available to industrial and other laboratories. Device, known as a benzoic acid cell, affords a means of calibrating platinum resistance thermometers and thermocouples at a temperature near 100° C more rapidly and conveniently and, under certain conditions, more accurately than is possible with boiling point of water. The acid, which is specially purified for the purpose, is contained in a cylindrical chamber about 12 inches long and 2 inches in diameter provided with a well.

TO AID SOLVENT DEVELOPMENT: Long-term contract was announced recently between U. S. Industrial Chemicals Inc., and Stanolind Oil & Gas Co., for the sale by U. S. I. of all water soluble oxygenated chemicals to be produced at the first two synthetic gasoline and oil plants using the Fischer-Tropsch process. This new source of these much needed chemicals, it is reported, will serve to stimulate development of new solvents, plasticizers, plastics and a host of other chemical products. Plants are being undertaken by Stanolind, a Standard Oil of Indiana subsidiary, and Carthage Hydrocol Corp. It is estimated that chemicals produced from these plants may exceed a total of 300,000,000 pounds annually.

DOUBLES IMAGE SIZE: In Philadelphia, Leeds & Northrup Co. is currently producing an objective lens assembly which doubles the size of an image an operator sees with a standard optical pyrometer. The larger image it provides is handy in open hearth shops in measuring tapping temperatures by sighting at the darker streak at the center of the tapping stream, and in reading temperature during spoon tests by sighting at the narrow ribbon of metal pouring from the spoon. Enlarged image is particularly useful in measuring temperature of thin or small-area objects. It makes the brightness match between the hot object and the pyrometer's disappearing filament" considerably easier to obtain—in cases where the target would otherwise appear almost as small as the filament.

SEALS LEAKS FASTER: Self-sealing aircraft fuel tanks that save 40 per cent in weight and seal bullet holes three times as fast as the old type were developed recently by United States Rubber Co., Los Angeles. Now being installed in the latest Naval aircraft, the tanks provide weight saving advantages to both jet and conventional craft. Amount saved in heavy bombers is as much as 1000 pounds. Tanks are effective with kerosene used in jets as well as gasoline. Sealing action is brought about by a substance which expands when gasoline, released by entrance of a projectile, seeps into it, and closes the "wound."

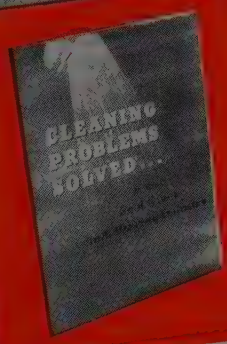
SIMPLIFIES REPIPING: Necessity for internal tubing is eliminated, and installation simplified through a method of manufacturing heated tanks employed by Kold-Hold Mfg. Co., Lansing, Mich. Heart of the process is the Platecoil which includes a flat surface on one side and is embossed on the other to form channels for circulating the heating agent. According to the company, it is possible

This WHEELABRATOR cleans 100,000 heat treated drills and cutters WEEKLY

With production of a large variety of carbon and high-speed drills, taps, cutters and reamers greatly increased, the Union Twist Drill Co. found that its airblast cleaning equipment was inadequate. Besides, many of these products could not be cleaned economically in existing equipment.

The installation of a 6′ PLAIN WHEELABRATOR TABLE for removing scale from the larger tools, and a 20″ x 27″ WHEELABRATOR TUMBLAST for handling the smaller pieces, satisfactorily solved the problem.

The TABLE cleans more than 100,000 pieces weekly . . . and the TUMBLAST cleans loads containing 1000 to 2000 pieces in ten minutes, whereas formerly more than four hours were required. Thorough scale removal has not only improved the appearance of all products but grinding time has been reduced as well.



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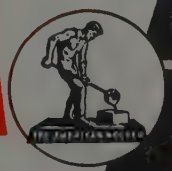
Billings & Spencer Co.
S.K.F. Industries, Inc.
Plomb Tool Co.
Park Drop Forge Co.
Cushman Chuck Co.
Simonds Saw & Steel Co.
L. S. Starrett Co.
Ex-Cell-O Corporation
Caterpillar Tractor Co.



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to build the tank and install heat transfer plates all in one operation. The flat surfaced plates can be formed and welded as part of the tank bottom, side walls or both. The development both simplifies clearing and provides maximum area of heat transfer. When repairs are required the Platecoils can be removed and replaced without shutdown.

RESEARCH ENGINEERS NEEDED: From Washington, National Advisory Committee for Aeronautics reports that Langley Memorial Aeronautical Laboratory at Langley Field, Va., needs 55 engineers and physicists to work in aircraft research. Openings are in electronic instrument development, engineering design, and fundamental research. A BS degree in aeronautical, electrical, or mechanical engineering or in physics is required. Openings are to be filled by Sept. 30. Applications will be acnowledged within 24 hours. These should be made on government application form 57 and mailed direct to NACA, Langley Field, Va.

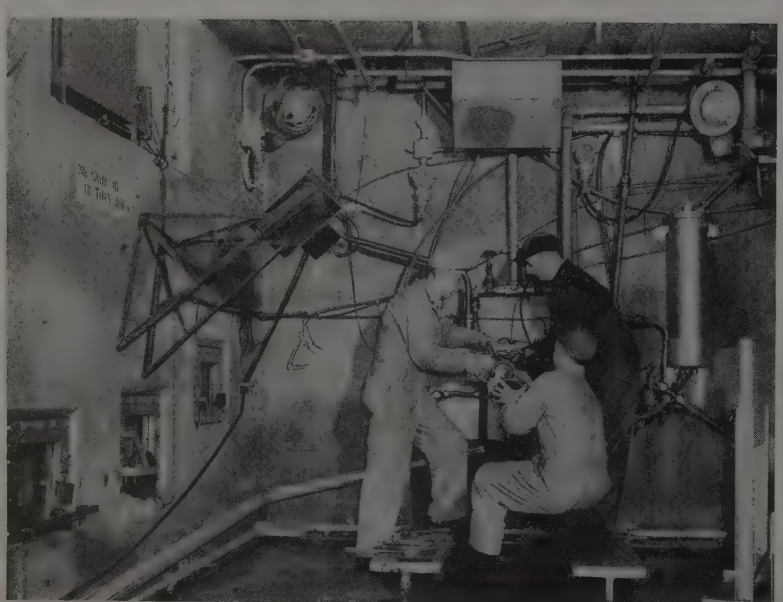
LIGHT FOR NIGHT PROJECTS: In Pittsburgh, it is learned, Arrow Supply Co. is currently producing a portable 3000-watt light tower and generator rig capable of furnishing adequate power and light for night construction projects. Mounted in a ½-ton steel utility trailer manufactured by American Bantam Car Co., Butler, Pa., the equipment includes a welded steel tower that operates on a hinge fastened to the trailer canopy. Latter, when erected, is 18 feet high; when folded it gives about 9 feet of road clearance. Two 1500-watt lights located on top of the tower are pivot mounted and have adjustable beams and spreads.

OIL FOR INSULATION: Oil is used as insulating agent for the tremendous electric power that courses through the huge electric transformer recently installed at the new plastics processing plant of B. F. Goodrich Co. in Marietta, O. Weighing nearly 52 tons, the equipment contains 6500 gallons of special oil, weighing about 25 tons. Banks of steel fins encircle the transformer and carry off heat generated within. Each of these contains seven oval tubes about 9 feet long through which oil heated by electric currents is passed. The 3-phase transformer takes 132,000 volts of alternating current from high tension wires and steps it down to 2300 volts and 5000 kilowatts output needed to run plant equipment.

GRAPHIC SOLUTIONS: Mathematicians at the University of California, Los Angeles, will be able to solve many difficult problems quickly and accurately with the aid of a machine made by General Electric Co., Schenectady, N. Y. The analyzer was used quite effectively recently at White Sands, N. Mex., in obtaining trajectory data required for firing V-2 rockets. During the war, it was found invaluable in studying problems involving radar, hydrodynamic flow, rotating machinery and airplane stresses. Although the analyzer operates mechanically, it is electrically controlled. Engineers set up necessary equations in the machine and its pens plot curves in accordance with continuous movement of shafts to give graphic representation of the solution of equations.

CRITICAL TEMPERATURE FACTOR: True dividing point between cold working and hot working metal is critical temperature above which a deformed metal recrystallizes, and below which deformed crystals retain their shapes, it was pointed out recently by Willibald Tricks, professor emeritus, Carnegie Institute of Technology, Pittsburgh. Different metals have not only different recrystallization temperatures but they also have different recrystallization speeds. Iron and steel recrystallize so rapidly, he pointed out, that steel tubes 40 in. long can be extruded in 2½ seconds. On the other end of the line, certain aluminum alloys recrystallize so slowly that tubes of these alloys barely crawl out of the extrusion press. A higher speed caused the expected tube to come out in short pieces.

MELTS IN WATER: A metal so soft that it melts in hot water is being put to work by Ford Motor Co. research engineers as a die material for making experimental parts. An alloy of bismuth tin and lead, the soft metal ordinarly is too soft to stand the tremendous pressures imposed on dies. Ford engineers have overcome this obstacle by freezing the die in liquid nitrogen. This freezing action changes hardness of the surface from a consistency comparable to dried putty to that of ordinary brass. From six to 10 stampings can be obtained between chillings in the frigid bath.



STATIC-TESTING ROCKET MOTORS: View left is that of the motor room in General Electric's test pit now being used by the company to static-test rocket motors up to 50,000-lb thrust—equivalent to 500,000 hp—as part of its operation with the Army's Ordnance Department in a joint long-range rocket research program. One of three, the test pit is constructed of steel reenforced concrete, and is set into the forward slope of a small hill. Heavy steel doors seal off the room while tests are in progress. Operating stand to which the rocket motor is attached during firings is on the forward wall. Bolted to the floor opposite the observation ports—composed of 3-in. bullet proof glass—are mirrors that reflect the motor and its exhaust to observers

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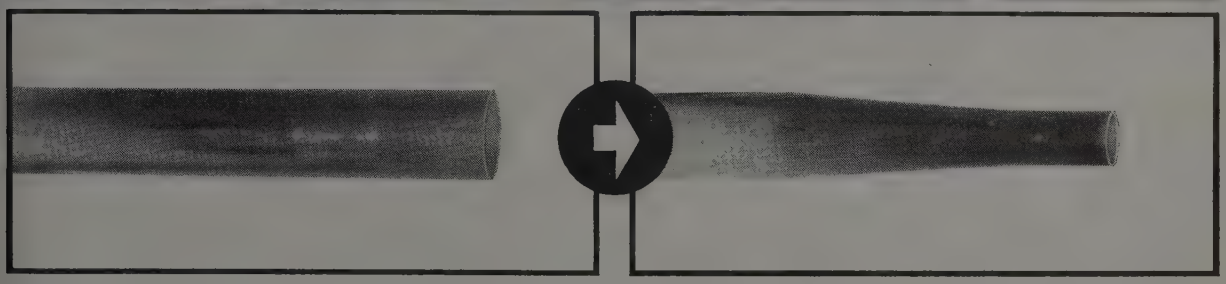
Skilled craftsmen, capable of forming and fabricating seamless and welded steel tubing to exact specifications. Must supply own equipment, be able to follow blueprint instructions and provide prompt delivery of finished work that will pass rigid inspection at our plant. Address Box 1947.



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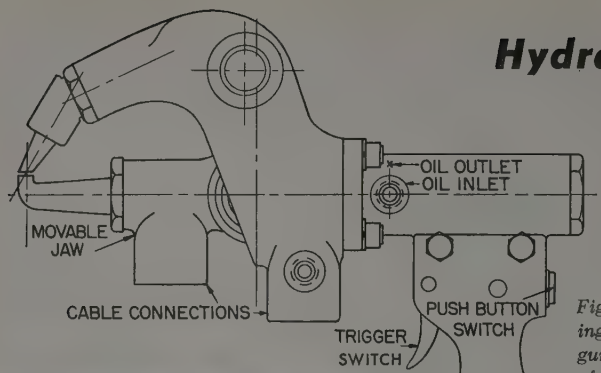

Fig. 1 (top)—Drawing of another style gun showing location of trigger switch, the pushbutton switch, movable jaw and cable and oil connections

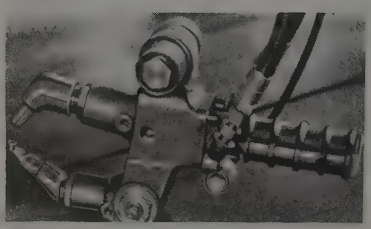

Fig. 2 (left) — One type of hydraulically actuated welding gun

DESTRUCTIVE burning and pitting at point of weld reportedly has been eliminated through the use of a new welding gun which applies uniform hydraulic pressure to the points, providing strong, uniform welds, regardless of point wear. Developed by Dalhart Engineering & Mfg. Co., Detroit, the gun, by reducing arcing to a minimum, has been found to make unnecessary welding helmets, spark and flash being virtually eliminated. Therefore, transformer heat is utilized to the fullest extent at the welding point.

With elimination of burning and sticking of points to metal, the life of the welding points has been greatly increased. Minimum life reported for points in use on automobile body production, at the rate of 3000 spots per hour, is a total of 108,800 spots. Mechanical speed of gun, shown in Fig. 2, is said to be limited only by the maximum speed with which a solenoid air valve may be operated.

Small cylinders and high fluid pressures combine to make a light weight, compact gun which may be attached to a bench or pedestal to make a stationary unit with foot controls. A pneumatic booster is utilized to build up hydraulic pressure. Welding point pressure may be varied by controlling the air pressure on the booster inlet, making possible a variety of metal thicknesses which may be welded with one gun. In addition, diameter of both the air and hydraulic pistons of the booster may be varied to suit any welding condition.

Operation of the gun is by pressing a trigger and pushbutton on the gun itself, as shown in Fig. 1. According to the manufacturer, it can be used for a wide variety of applications. For example, a long stroke cylinder may be attached to a deep throat yoke for welding of long or irregular shaped articles.

Idle Machine Time Reduces Manufacturing Costs

Allowing its seam welders to stand idle 6 or 7 weeks out of every two months actually is saving money for the Heywood-Wakefield Co., Gardner, Mass. Used in fabricating support pedestals for railroad and bus coach seats of 18 gage stainless steel, the welders, installed by Progressive Welder Co., Detroit, turn out as many pedestals in an hour as were turned out in a week by the former process.

Ten minutes were required for fabrication prior to seam welding. This had to be followed by grinding. The company redesigned the pedestals slightly for fabrication by seam welder which had a production capacity far in excess of any the company could use. It is said, however, that in spite of the large amount of time the machine is idle, the machine had paid for itself in a few weeks. It is designed so that if the occasion arises, the welding wheels may be removed and the machine used for either press of spot welding of other parts.

Machine is equipped (for seam welding) with a special moving fixture which carries the pedestals through between the welder wheels. This fixture has a collapsible copper mandrel which serves to hold and locate the pedestal during welding. The fact that it is collapsible permits quick removal of the finished part. Seam welding has also practically eliminated all grinding of the welds, it is said, as well as avoiding destruction of stainless steel qualities.

Refractory Oxides Symposium To Be Held

Symposium on special refractories, including refractory oxides and carbon, will held at Bedford Springs Hotel, Bedford, Pa., on Friday, October 10, sponsored by Refractories Division of Harbison-Walker Refractories Co., Pittsburgh. According to the company, the program is to be built around those refractories which became of greater interest during the war years, in part due to research in atomic activity and jet-propulsion.

Technical sessions, scheduled for Friday afternoon, are as follows: Introduction to the Study of the Refractory Oxides, Raymond E. Birch, Harbison-Walker Refractories Co.; Simple Oxide Porcelains for Jet Planes and Projectiles, R. F. Geller, National Bureau of Standards; Properties and Uses of Mullite and Pure Alumina Refractories, G. Bickley Remmey, Richard C. Remmey Sons Co.; Zircon and Zirconia Refractories, William J. Baldwin, Titanium Alloy Mfg. Co.; and Carbon as a Refractory Material, F. B. Thatcher, Great Lakes Carbon Corp.

Wartime Technological Reports Index Published

Reports on wartime technological developments in the United States, Germany and other foreign countries are indexed in the third volume of its kind made available by Office of Technical Services, Department of Commerce, Washington. The index is intended for use with the OTS Bibliography of Scientific and Industrial Reports, published weekly, and which lists all reports acquired by the office and contains a brief abstract of each.

Third volume of the index provides a ready reference to 13 issues of the bibliography from October 3 to December 27, 1946. It also includes reference to the German patents in chemistry, electronics, scientific instruments, photographic equipment and processes and transportation equipment.

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TIN PLATE TRANSPORTATION

. . . through production to shipment handled by fleet of 47 storage battery-powered industrial trucks operating about 22 hours per day

OPERATING almost continuously 'round-the-clock, or between 21 and 22 hours of a day's 24-hour triple-shift, a fleet of storage battery-powered industrial trucks is used 7 days a week in the tin plate department of Carnegie-Illinois Steel Corporation's Irvin Works, Dravosburg, Pa., to handle coils of strip and tin and black plate in sheets, from production through to outward shipment. Tractors, lowlift platform, together with fork-lift trucks, of regular and special types, as well as ram trucks, make up the 47-truck fleet.

While actual figures were not made available by the Irvin management, it was stated during a recent survey of the use of battery-powered trucks, that there had been substantial savings in manpower as well as in man-hours; faster movement of material in process flow, through inspection and packaging, into and out of preshipment storage, and in actual shipment-loading operations.

In the latter, for instance, two battery-powered fork-lift trucks are used in the loading of box cars. Each truck, in an 8-hour turn, is used to load from 17 to 18 box cars, each of 40-ton capacity. This is on the average of 22 minutes to a car.

At one time it was found that the

Fig. 1—Tin plate, export packed, being moved from packaging department into temporary preshipment storage by highlift fork truck. Weight of load is approximately 8500 pounds

Fig. 2—View of 48-section charging panel in battery and maintenance room adjacent to tin plate department. Photos courtesy Electric Industrial Truck Association

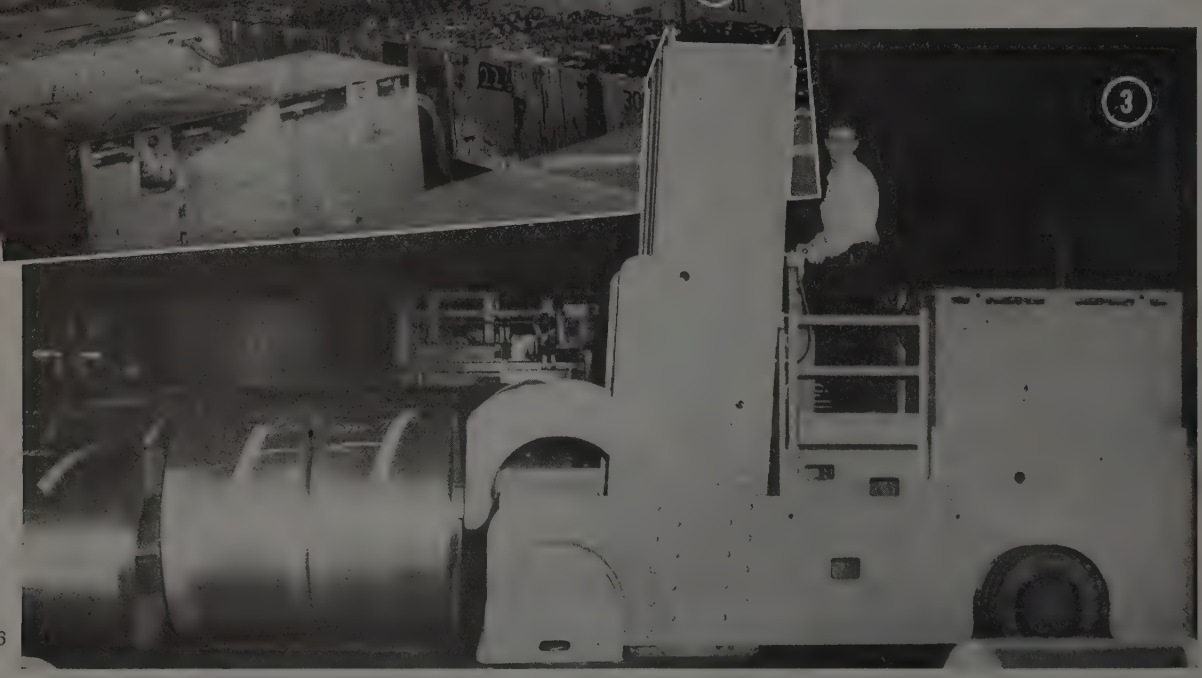

Fig. 3—Storage battery-powered ram truck, capacity 30,000 pounds, about to move two coils of hot rolled strip into Ferrostan (electric tin-plating process) department

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(Plus or Minus .00025)

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Thicknesses from .005 to .187, sheared or slit to your width.

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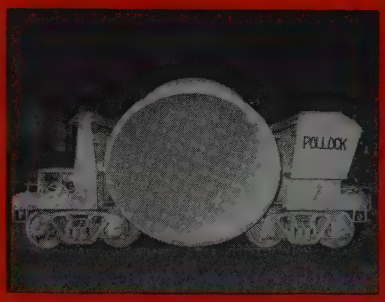
Pollock's modern cinder car design is the result of 50 years' experience in building this type of car. Made for air, steam, or electric operation, Pollock cinder cars are sturdily built of all-rolled welded steel construction. Operating equipment can be arranged to dump from either side, and trucks have A. A. R. standard wheels, axles, bearing brasses and springs. In addition, special end-thrust bearings can be provided where standard A. A. R. bearings wear too fast, or roller bearings of your choice can be provided. Cars can be equipped with K brakes or AB brakes. Cars can be built to handle any size pot up to railroad clearances available or to carry two pots if desired.

Pollock cinder cars are made in various sizes, designs and capacities, and are widely used throughout the iron and steel industries. Let Pollock advise you as to the type best suited to your individual plant requirements. Write or call today for complete information.



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duty-demand upon some trucks was in excess of the rated battery capacity set up for them. This was due to increase in operations, plus heavier loads and assignment of trucks to duties not contemplated at time of their acquisition. The remedy was found to be in the replacement of existing batteries with those of greater capacity. When this was done reports of "shift-end sluggishness" ceased. A battery of greater capacity—for instance one of 8-hours for one of 6-hours capacity—is simply placed in the battery compartment, the lesser capacity battery being relegated to trucks performing lighter duties as a reserve or alternating battery.

Tasks performed by the trucks in the tin plate department begin with movement of hot rolled coil into hot strip finishing and also into storage. Hot strip, after being sheared to length goes directly to shipment. From storage the hot rolled coils are moved into the pickle line and upon emergence are moved, either to the 3-stand mills where the coils are cold reduced and then side trimmed or cut to size and annealed as sheet, or are taken to the 5-stand mills for cold reduction, then cleaned, annealed, temper-rolled and sheared to size. Movement of coils between cleaning and annealing is made on transfer cars, these being moved by gas-powered tractors.

From tin plate shear line movement of sheets is into white pickle; then, in bosh tanks containing water and a small amount of acid to prevent oxidization, into the tin house for hot dip tinning. Bosh tanks are moved by battery-powered trucks equipped with a special type fork. Some 21 machines in the tin house are serviced by these specially equipped trucks.

From the tin house stacks of plate are taken into the inspection and assorting room. Trucks assigned to this work are equipped with clamps, specially padded with lamb's wool. These hold the stacks in place en route, preventing movement, being released as the stacks are placed on tables in front of workers in the inspection and assorting area. After this, movement is by fork-lift truck into the warehouse, thence into packing, then into temporary storage, and finally into outward shipment via box cars or over-the-road trucks.

Weights of items handled range from 9000 to 14,000 pounds each for the coils, while the bosh tanks with load weigh slightly in excess of 6000 pounds. Stacks of plate up to 10,000 pounds in weight constitute the heaviest loads handled by the battery-powered fleet, with maximum length of work-run being some 300 feet.

Tin plate is packaged both for domestic as well as for export shipment. In the latter instance the plate is wire-bound into packages that have been specially packaged and sealed, the entire package being wired on to single-faced pallets. These export packages weigh from 750 to 1500 pounds. Domestic shipments are, for the most part, in heavy kraft-board cartons, these too being wired to single-faced pallets, permitting easy handling by means of the fork-lift trucks.

DAYLIGHT INDOORS: One of the big manufacturing aisles of Westinghouse Electric Corp.'s East Pittsburgh, Pa., plant has the brightness of daylight on the working plane, as a result of two years of experimenting with various lighting systems. Installed are 213 mercury vapor lamps of 1000 w each and 142 incandescent lamps of 1500 w, all mounted in aluminum reflectors, which give an average of 45 ft-c of light near floor level. Incandescent lamps were interspersed with mercury lamps to provide color correction

Temporary Storage

In temporary (preshipment) storage, the packages, depending upon size, are tiered from eight to 14-high by means of fork-lift trucks and/or overhead cranes equipped with special type grabs. In movement from packaging to warehouse, from four to six packages are handled by the fork-trucks at a time.

Some of the older and smaller-capacity trucks move pigs of tin, from receipt, into storage and thence to the tin house for use. Use also is made of these smaller capacity trucks for handling of other supplies such as kraft-board cartons in flats, knocked down cases, and various other miscellaneous items.

Battery charging/changing room and maintenance department is located adjacent to the tin house, almost mid-area in the section where the battery-powered trucks operate. A 48-section charging panel permits electricians assigned to this work to keep a constant supply of freshly charged batteries for assignment to the trucks. Overhead electric hoists, and hooked chains that fit into lugs at the four corners of the battery cases, permit change and replacement of batteries in a matter of only a few minutes. Trucks are off duty for a battery change for a total of not more than 10 minutes. An auxiliary station with a 4-section charging panel is located in another section of the plant. It is used to service trucks that are operating in that particular area.

Battery condition is carefully observed and checked at all times. Watt-hour meters, or flash indicators on the trucks keep operators informed throughout the work period as to the energy charge in the battery on their truck. Operators are under strict orders to report for battery change should there be any indication that the battery is becoming exhausted. Trucks are withdrawn from service weekly for greasing, inspection and check-up. This preventive maintenance keeps the fleet of trucks in excellent operating condition.

Electric Circuits

(*Concluded from Page* 96)

and others. • The most efficient use of the Spraywire process, as it is called, requires a stencil or template, with openings cut in accordance with the wiring design to be sprayed. Material recommended for stencils is a special "Scotch" tape, developed for use with the process in the laboratories of the Minnesota Mining & Manufacturing Co.

This tape has a light adhesive on one side so that it will adhere to panels, and yet be easily removed when spraying has been completed. Its surface, which is exposed to sandblasting and metallizing, has a hard enough finish to protect the covered portions of panels from the effects of the abrasive and sprayed metal. Tape stencils can be mass produced by being die-cut in continuous strips. They are used only once, and the metal deposited on them may be salvaged. Still in the experimental stage are stencils made of other materials, including steel.

Base materials suitable for use with the process include plastics, wood, glass, ceramics, and other dielectrics. Among the inexpensive plastics which can be used are the phenolics, including mineral-filled compounds, and polystyrenes which have suitable physical properties. Chassis which embody sprayed circuits need not be flat panels; they can be premolded and the sprayed conductors can be applied to curved portions of surfaces.

Following the application of a stencil to a panel, the panel is sandblasted. This results in the formation of grooves in the base material, and roughens the latter sufficiently to insure a good bond between the sprayed metal and the panel. Stencils remain in place until completion of metallizing.

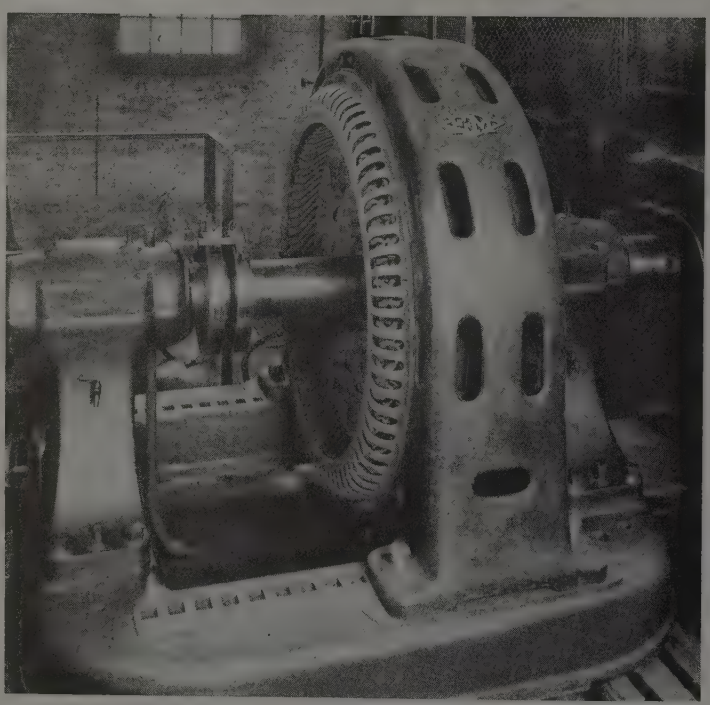
Sprayed conductors are at least 0.005-inch thick, and may be more. From the standpoint of production it is most convenient to deposit between 0.005 and 0.007-inch of metal. Resistance of a conductor is determined by its width, and control of that dimension makes it possible to spray conductors that are equivalent to given wire sizes. Conductivity of sprayed metal is excellent; its porosity makes it only 10 to 12 per cent more resistant than similar metal in the form of a comparable drawn wire. The opposite sides of a single panel can embody sprayed circuits and the conductors can be interconnected by means of metal eyelets which pierce the base material. These eyelets, inserted prior to sandblasting or metallizing, are also used as a means of connecting the leads of sockets, components, etc., to the sprayed conductors.

Use of stencils with the process has been eliminated experimentally. Under procedures still being tested, grooves are molded into the chassis. The entire panel is then metallized, and the surplus metal machined off. While this variation appears to offer some advantages, use of stencils and sandblasting has been found to be more satisfactory. Machining operations are costly, and copper, the most commonly used conductor, is not easily machined.

One of the principal advantages of the spraying technique is the speed with which panels can be completed by its use. For example, with an efficient production setup including two metallizing guns, the production of 4500 panels 4 x 8 inches requires approximately 5 hours. These panels are exchange grids; they embody about 60 inches of "wiring" and require no eyelets. Considerable time is saved by the elimination of the need to prepare and assemble wires for manual wiring, and to solder them into position. Inspection time and rejections for faulty wiring are also reduced.

Spray-installed circuits are as strong as the material into which they are sprayed and, being inlaid in this material, they are not likely to be damaged during servicings after installation. The elimination of layers of wiring greatly facilitates installation and simplifies servicing in the field. It is easier to make a replacement of an electronic component, for example, when no wiring has to be moved in order to reach the defective part. Such components are cut out of circuits and new ones easily riveted into position.

The process is adaptable to a wide variety of applications in products which must incorporate extensive wiring. Compactness of design, economy of space, and innovations in the form factor are offered the designer. Sprayed circuits can be employed for very high frequencies in certain applications. The equipment required for the process is economical to install and operate.



STILL GOING STRONG: One of the first heavy duty synchronous motors ever built, this 2-phase installation is seeing everyday service driving grinders as it has done since 1913. Located in the plant of Henry Disston & Sons Inc., Philadelphia, it is said to represent a pioneering effort of Electric Machinery Mfg. Co., Minneapolis, to break the "inverted alternator" tradition which had limited synchronous motors to a few low-starting-torque jobs

To Provide Machine Tool Exhibitors with Lubricants

E. F. Houghton & Co., Philadelphia, will maintain a mobile service at the Machine Tool Show in the Dodge-Chicago Plant, Sept. 17-26, to provide lubricants and advice on lubrication problems to exhibitors. Supplies will include special oils, greases, hydraulic oils, rust preventives and coolants.

Welded Steel Cuts Cost of Base 45%

By W. E. Benninghoff, General Manager
TOCCO Division
The Ohio Crankshaft Company, Cleveland, Ohio

BY thinking in terms of welded design for the fabrication of parts and assemblies of TOCCO Induction Heating Equipment, we have been able to benefit in two important ways.

1. Day after day, we use welded design in the development of work-handling fixtures and accessories for standard TOCCO machines and in the designing of special TOCCO machines. Each must be built to match a specific application. Welding permits us to use greater ingenuity and freedom in the design of this equipment and to manufacture quicker, at lower cost.

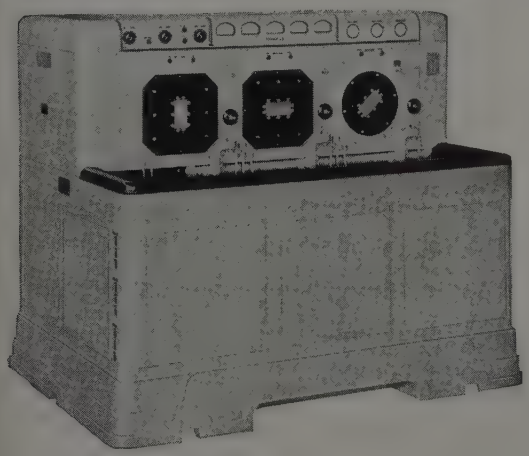


Fig. 1. Completed TOCCO Induction Heating Machine with former base.

2. In the manufacture of our standard TOCCO machines of all sizes and types, we use welded design for many parts to provide maximum rigidity and strength, lighter weight and lower cost. It also enables us to continually improve these parts because we are not restricted by patterns. The cabinet frame of the 150 KW TOCCO unit shown in Fig. 1 is an example of the larger welded steel parts which we have used for some time.

Recently we have also changed the base of the machine shown in Fig. 1 from cast iron to welded steel. The cast iron base weighed 3175 lbs. compared to 1180 lbs. for the welded steel base shown in Fig. 2. It was necessary to machine the top of the cast base to secure level mounting for the motor generator set. The welded base is

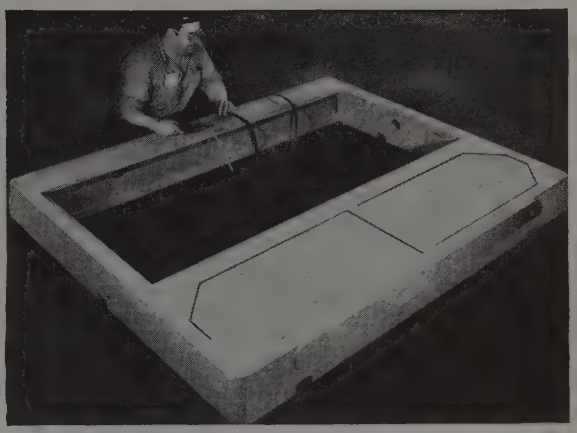


Fig. 2. The new welded steel base for 150 KW machine shown in Fig. 1.

sufficiently level as fabricated and requires no machining, thus providing further saving.

The total net cost saving with the welded steel base is 45%.

The base of this TOCCO machine supports a 150 KW high-frequency motor-generator, transformers, electrical controls and other equipment, housed in a steel cabinet. The total weight of the machine, including the base, is about 12,000 lbs. In service, it must be permanently level, rigid and have good vibration-dampening qualities.

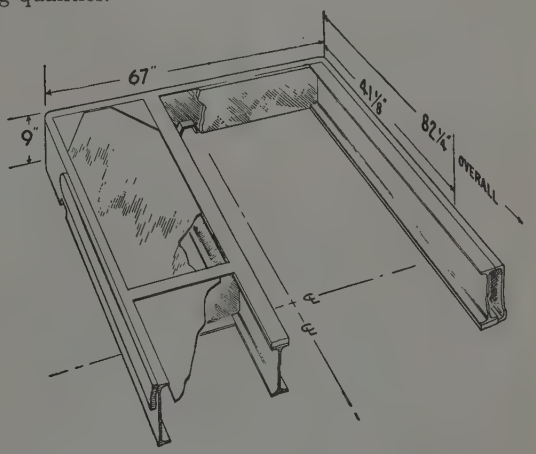


Fig. 3. Schematic drawing of fabricated base.

The construction of the welded steel base is shown in Fig. 3. Made of standard mill shapes and plate, it requires a minimum amount of welding, resulting in close control of tolerances and minimum cost. It is proving highly satisfactory in performance in every respect.

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Advertisement

Treating Cyanide Waste

(*Continued from Page* 93)

Means of proportioning concentrated waste into the main flow is provided.

Together with cyanide wastes outlined above, wastes from other plating operations will often be present. Hexavalent chromium from chrome plating, anodizing of aluminum, and certain dichromate pickle operations may be the most common. A method has been worked out whereby chrome waste treatment can be carried out with ferrous sulphate, iron turnings, or sulphur dioxide either as a separate process or as a treatment subsequent to cyanide treatment.

Waste from Case Hardening Steel: Process of heat treating steel parts by cyanide generally consists of immersing the parts in a molten bath at a predetermined temperature; bath consists of a mixture of sodium cyanide with other necessary ingredients, such as alkali chlorides. After the part which is to be hardened has been placed in the molten bath for the required period, work is removed and quenched in either oil or water. Water quenching in a continuous flow of water is often used.

The waste problem naturally arises from overflow of water carrying with it sodium cyanide which has been dragged from the molten bath along with other compounds in the bath, as well as some iron complexes. In his report before the conference, Dobson stated that the discharge from baths of this nature may be expected to run as high as 50 to 100 parts per million of free cyanide. Also, the heat treater may have the problem of disposal of spent heat treating baths.

In the pickling of sheet steel for the removal of mill scale, the metal is usually dipped in dilute sulphuric and hydrochloric acid. As the steel leaves such a pickle bath it has been reported[2] that a "pickle smut" consisting of materials not soluble in the acid, such as iron carbide, silicon, silicon carbide, copper and copper sulphides remains on the surface. In addition, ferrous sulphate and ferrous chloride are formed and cling to the surface. If the sheet is then air dried or neutralized with caustic, the ferrous iron is converted to ferric which is reported to cover the "pickle smut" and forms a coating which is quite difficult to remove.

This objectionable coating is reported to accelerate rusting, make for poor adhesion of paint and plating, accelerate the formation of dross in galvanizing, and generally spoil the finish of the sheet. This objectionable coat can be removed by agitating the pickled sheet in a solution containing 0.2 ounces per gallon of sodium cyanide and 0.2 ounces per gallon of sodium hydroxide. The cyanide reacts with the residual surface salts yielding salts that are entirely soluble.

Waste from such a process consists of wash waters which will carry an appreciable concentration of all these products together with the dragout of the original solution plus the dump solution itself. Unlike plating solutions, it is reported that neutralizing solutions are dumped frequently to maintain quality work. The resulting mixture of wash and dump solutions usually vary between 200 and 1000 parts per million of cyanide.

In discussing the chemistry involved in the chlorine treatment process, Dobson reported that when chlorine is added to a solution containing cyanide, with sufficient free alkali present to maintain a pH above 8.5, cyanide is oxidized to cyanate according to following reaction:

$$NaCN + 2NaOH + Cl_2 \rightarrow NaCNO + 2NaCl + H_2O$$

Based on tests conducted in the Wallace & Tiernan laboratories, the reaction was found to be practically instantaneous under all conditions, being complete in less than one minute. Theoretically, it requires 2.73 parts of chlorine per one part of cyanide. It was pointed out that most trade wastes contain a substantial portion of the required free alkali.

If an excess of chlorine is added, free chlorine residual will be found in the solution after 1 or 2 minutes. Dobson reported that in all trade wastes and laboratory samples that have been tested, no cyanide, within the limits of titration accuracy, has been found in the presence of free available chlorine at pH 8.5.

Oxidation of free cyanide by chlorine has been checked according to the following procedure: To a known potassium cyanide solution, having a concentration of about 50 p.p.m. cyanide, a boric acid-sodium hydroxide buffer is added to hold the pH at 8.5. When a quantity of chlorine is added which is substantially less than the theoretical amount required to oxidize all the cyanide to cyanate, the reaction occurs almost quantitatively.

For instance, in a potassium cyanide solution containing 50 ppm cyanide, when enough chlorine is added to theoretically convert 58 per cent of the cyanide to cyanate, 58 per cent of the cyanide disappears, and 49 per cent of the cyanide appears as cyanate. However, as more chlorine is added to such a solution, particularly beyond the 2.7:1 ratio, the cyanate which is formed is again oxidized, according to the following equation:

$$2NaCNO + 4NaOH + 3Cl_2 \rightarrow 2CO_2 + 6NaCl + N_2 + 2H_2O$$

To carry out this second oxidation, it requires 4.09 parts of chlorine per part of cyanide and 3.08 parts of caustic soda, or the total oxidation of the cyanide to carbon dioxide and nitrogen requires

WELDED POWER ROLLER: Weighing approximately 1 ton, this 3½-ft wheelbase power roller utilizes an all-welded steel construction, its main chassis consisting of ¼ x 5 in. plate with 3-in. channel ribs welded at intervals for support and rigidity. Each roller section is of water tight welded construction and is filled through an inlet in the side wall. Made by Steel Equipment Co., Cleveland, the roller has a 15-gal tank to supply water to the rollers and is powered by a 6 hp gasoline engine. Photo courtesy Lincoln Electric Co.

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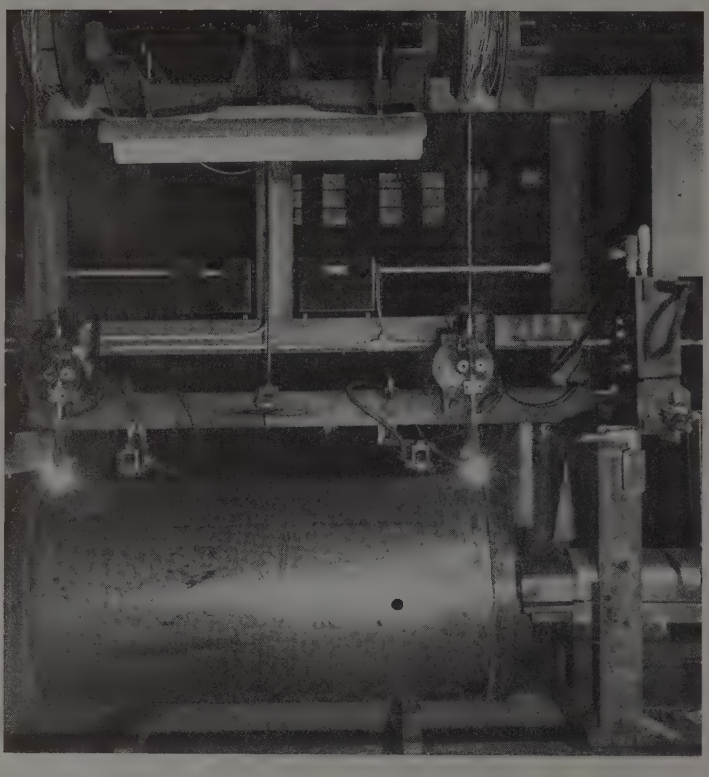
YALE WORKSAVER



TWO-MINUTE TANK WELDING: Both ends of gasoline tanks 36 in. in diameter and 68 in. long are welded simultaneously in 2 min using automatic arc welding equipment and fixtures in the plant of Dayton Pump & Mfg. Co., Dayton, O. Two General Electric WFB welding heads feed bare or lightly coated electrodes and maintain a constant arc voltage through thyratron control panels. After casing and headers are placed in the fixture, a hydraulic ram presses headers onto casing to provide a tight lap joint. Tank is automatically centered and the entire mechanism rotated

6.82 parts of chlorine and 6.16 parts of caustic per part of cyanide. This second reaction occurs very much more slowly. In order to reach completion, excess chlorine must be added. For a potassium cyanide solution of 50 ppm initial cyanide concentration in a boric acid-sodium hydroxide buffer, the rate and completeness of the reaction is shown in Fig. 1.

It will be noted that 7.35 parts of chlorine per part of cyanide were required as compared with the theoretical 6.82. It was believed that most of this additional chlorine is used to oxidize the nitrogen to some of the oxides of nitrogen. If the pH of the solution is permitted to drop very much below 8.5, nitrogen trichloride may also be formed.

Commercial Adaptation: While the cyanide oxidation has been shown in two steps, it was pointed out by Dobson, that in commercial applications the reaction can be carried out in a single contact tank if sufficient chlorine is added initially. The oxidation of cyanide to cyanates by chlorination is exothermic, a 1000 ppm cyanide solution, as potassium cyanide, will have a temperature rise of 7.16°F when chlorinated, assuming no heat dissipation. Naturally, it is expected that other concentrations will have proportionate temperature rises. This is important only in cases of the higher cyanide concentrations.

For instance, in concentrations such that the final temperature of the solution exceeds 120°F, a substantial portion of the chlorine added will react to form chlorates, and only a small percentage of the chlorine will react with the cyanide present. However, it was emphasized that if chlorine is added slowly enough to allow the solution to remain cool or if the solution is cooled or diluted to reduce final temperature below the critical temperature, high concentrations can be handled.

In pointing out the significance of these reactions from the viewpoint of stream pollution, Dobson brought out the fact that the cyanates have a toxicity to fish of approximately 1/1000 that of cyanides. Naturally, in designing a treatment plant, each problem will have to be considered on the basis of local conditions. However, it would seem reasonable to suppose that the oxidation of cyanides to cyanates will be sufficient except in cases where practically no dilution is present or in cases where a large number of plants are discharging cyanide to the same water shed.

In support of this, it was pointed out that the hydrolysis of cyanate to ammonia and carbon dioxide under acid conditions is a familiar reaction. In very acid streams, this reaction may be of importance in eliminating the cyanate radical. However, velocity of reaction at near neutral pH's is not known.

Similarly, under alkaline conditions, oxidation of the cyanate by the dissolved oxygen in the stream may occur, but it is believed its velocity is too slow to be of practical importance. In any case few plant effluents, even without further dilution, contain high enough cyanate concentrations to affect stream life.

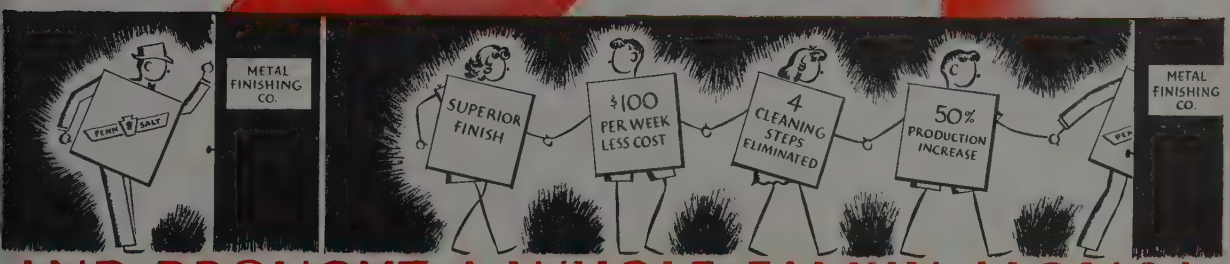
While details of the reaction between free cyanide and chlorine are indicative of reactions that occur in actual composite wastes, tests should always be made on the actual waste before conclusions regarding quantities of chlorine required or rates of reaction are reached. As an example, some wastes have required as much as four parts of chlorine per part of cyanide to obtain a free chlorine residue at the end of 1 minute.

Plant Design: Design of a treatment plant for the elimination of cyanide waste by chlorination will vary widely, depending on a large number of factors. As has already been pointed out, factors of operation of industrial plants which control the concentration of cyanide present in waste and rate of change of concentration, as well as quantity and rate of change of quantity of total waste and amount of other polluting factors present will have a large bearing on final design.

Amount of dilution and quality of water in the receiving stream will also have a major effect on the design of the plant, particularly with respect to the amount of oxidation that will be required of the cyanide and the amount of metals which must be removed. Because of the natural high chlorine demand and natural high buffer capacity of domestic sewage, it was pointed out that treatment of cyanide wastes can almost always be carried out more economically at the industrial plant than at a sewage treatment plant.

Simplest type of treatment plant which is applicable to the small industrial establishment is illustrated in Fig. 4. Here the concentrated and dilute cyanide solutions which have been freed from their

Opportunity knocked..



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acid content by separate sewers are carried to a central mixing tank which is provided with an agitator. After waste liquor has been fed into the storage tank, pH of the waste can be raised, if necessary, by the addition of sufficient lime directly into the tank or by the gradual addition of caustic as the solution is pumped from the tank.

After the waste has been thoroughly mixed and the pH adjusted, it is then pumped from the tank through the injector of the chlorinator where a controlled and measured amount of chlorine is added and returned to the storage tank. To avoid objectionable fumes, the pH of the waste must be carefully controlled, and the dissolving and mixing of the chlorine and waste must be rapid and complete. Local acidification must be carefully avoided. A plant disposal unit designed in accordance with these general principles has been described.[3]

When quantities of waste being discharged by an industrial plant are so large as to make retention tanks too big for economical construction, continuous treatment with automatic controls was recommended by Dobson. Fig. 5 illustrates, schematically, this type of plant. Assuming waste is from a plating operation, wash water from alkaline and electrolytic cleaners, from cyanide rinses, and from plating rinses is carried continuously to the treatment plant.

Concentrated cyanide waste, including a dump solution of cyanide rinse and dump plating bath solutions, is carried in a separate sewer into a storage tank and proportioned into the general waste system by a reagent pump. Addition of chemicals to this solution can either be carried out in a flume, as indicated in the drawing, or in a pipe line, whichever seems more economical.

The alkali, either sodium hydroxide, hydrated lime, or soda ash is added at a rate sufficient to hold the pH at the required value. The choice between hydrated lime and sodium hydroxide is a matter of balancing the lower cost of the lime against the ease of feeding of the liquid caustic. Another factor to be considered is the production of sludge when lime is used. In larger plants, use of automatic dry feed equipment for feeding the lime can be justified. If caustic is used, a proportioning valve or a reagent feeder should be used.

In either case, rate of addition of caustic should be controlled by a glass electrode pH apparatus located beyond the point of chlorination. Chlorine should be added, using pumped plant effluent for operation of the chlorine injector. If there are wide variations in the rate of flow, an automatic chlorinator should be used.

A reaction tank or a series of reaction tanks should be provided if it is necessary to oxidize the cyanide to carbon dioxide rather than to the cyanate. They are also advisable safety features if substantial variations in the cyanide content are expected. It was pointed out by Dobson that a plant substantially as shown in Fig. 5 has been built and is in operation. It was designed for an average flow of 400 gallons per minute with a concentration of 100 ppm of cyanide. It was reported that operations to date have yielded a cyanide free discharge.

Similar principles were involved, according to Dobson, in the first cyanide treatment plant using chlorine in the United States. This plant was designed by Albright & Friel Inc. of Philadelphia in co-operation with Metcalf and Eddy of Boston. It was erected in 1942 at Johnsville, Pa., and is now known as the U. S. Naval Air Modification Unit. The wastes, which average 50,000 gallons per day, originate in metal plating and finishing operations including anodizing. The plant is substantially as shown in Fig. 2.[4] The untreated waste characteristics for the above plant have been reported to be as follows:[5]

	Average	Maximum	Minimum
pH	7.7	10.5	2.5
Chromium p.p.m.	100.0	2500.0	70.0
Cyanide p.p.m.	2.0	40.0	1.0
Cadmium p.p.m.	10.0	60.0	3.0
Copper p.p.m.	3.0	40.0	1.0

Treated wastes as discharged to the river, were reported as follows:

pH	9.6	11.5	8.5
Free Residual Chlorine	0.6	1.0	0.3

Chromium, cyanide, cadmium, and copper in the treated waste were all below titratable limits. It was reported by Dobson that the treated waste from the plant is discharged into a tributary of a stream and no complaints have been received.

Other Methods: As has already been noted in general, a method of treating plating room wastes was described by Professor G. E. Barnes of Case Institute of Technology, Cleveland, whereby precipitation of chromium was being carried out by reduction of the hexavalent chromium to trivalent form with ferrous sulphate, the cyanide being removed by chlorination using lime as a pH control material. The two processes in this case are carried out separately since the wastes are separated prior to entering the treatment plant.

REFERENCES

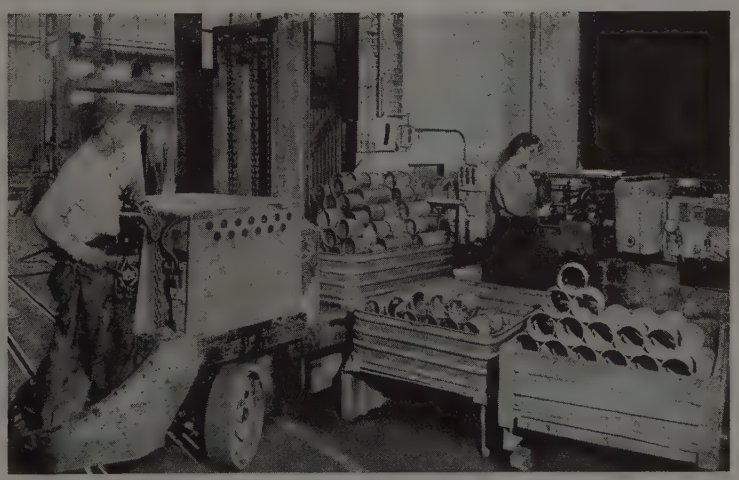
1. This report was also presented at the annual conference of the Michigan Sewage Works Association, Jackson, Mich., May 16, 1947.

2. C. W. Ridge, "The Cyanide Neutralizing Process", presented before the 13th meeting of the Galvanizing Committee, Pittsburgh, Pa.

3. Prof. G. E. Barnes, Trans. Third Industrial Waste Conference, Purdue University, May 21, 1947.

4. Freil and Gordon, "Cyanide Removal From Metal Finishing Wastes", Waste Works and Sewerage, 92, 97-8 (1945)

5. Based on analysis supplied by R. A. Morrissey, Sanitary Engineer, U. S. Naval Air Modification Unit, to J. G. Dobson, Wallace & Tiernan Co., Inc., Newark.



STORAGE SOLVES PROBLEM: Temporary storage between successive operations created a major handling problem in the Passaic, N. J., plant of Hewitt-Robins Inc., because of the great variety of equipment being manufactured simultaneously. Perplexing situation was remedied by skids and a battery powered platform lift truck of the type shown in the photograph. Work is moved to a storage yard after completion of any operation unless the next operation follows immediately, freeing shop production areas of all work except that actually in process

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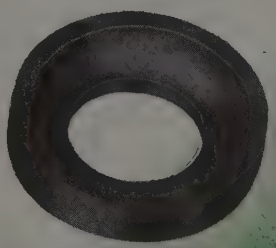
Marine engines, road rollers, material handling equipment, conveyors, oil well drilling rigs, midget automobiles . . . these and many other mechanisms are now being operated with *greater efficiency, smoothness, and increased power,* thanks to Twin Disc Clutch Co. and Graphitar. Twin Disc manufactures hydraulic drive units in 1 to 300 HP models. Installed, as illustrated, in the Twin Disc Small Hydraulic Coupling (1 to 25 HP), the *Graphitar* seal assures a *long-lasting close fit,* because it is unusually resistant to wear, warp, chemical attack . . . and its dimensional stability is not affected by temperature extremes.



ydraulic power unit nd dependably

Graphitar seals, cylinder liners, bearings, vanes, and other parts are improving the efficiency of scores of mechanisms, because of Graphitar's *many unusual characteristics.* It is self-lubricating, chemically inert, and mechanically strong. It will not melt or fuse at any temperature. *It is featherweight.* We are equipped to mold Graphitar to any practical shape and size and to finish parts to tolerances as close as .0005" in small sizes. Send us sketches of your products and our engineers may show you where Graphitar parts will improve mechanical efficiency and save you money. *Ask for 44-page catalog.*

ICHIGAN

MODERNIZED CONTROL SYSTEM

Increases Blooming Mill Output

Reduction in time required to reverse motor armature serving 44-inch blooming mill results in stepping up semifinished production. Fast reversal also reduces regenerative and motoring current peaks and affords improvement in commutation of motors and generators

PRODUCTION of a 44-inch blooming mill was increased recently about 20 per cent as a result of modernizing the electrical control system. A modern rotating regulator is used in place of the former reverse-plugging system and as a result, the time lost in reversal of the mill motor is reduced sufficiently to enable the rolling of 38 additional tons of steel per hour.

Electrical drive on the 44-inch mill replaced a steam engine in January 1921 and has been in continuous operation ever since. The motor is a double-armature 5800 horsepower, 600 volts direct current, 40/120 revolutions per minute motor. Maximum size of ingots rolled are 25-¼ x 30-¼ x 82 in. weighing 7.35 tons. These are normally reduced to 11 x 10 blooms in 23 passes. Power for the motor is supplied from a flywheel motor-generator set made up of two 2500-kilowatt, 600 volt direct-current generators and a wound rotor induction driving motor. The primary power input to the motor is limited to 3350 kilowatts by means of an automatic liquid slip regulator.

Motor and generator armatures are connected in a series loop. The motor is reversed and its speed regulated by control of the generator's field current. The motor field current is maintained at its maximum value excepting for speeds in excess of base speed when it is reduced. With the control equipment as supplied originally, the motor and generator fields were energized from a constant voltage bus and the field currents were controlled by resistors and contactors directly in the field circuits. The field time constants of the large machines are high and since this type of control is not readily adaptable to high field forcing the obtainable rate of acceleration or deceleration of the mill, and consequently the time of reversal, is relatively long.

For most blooming mill operations,

By ERLING FRISCH
Industrial Control Division
Westinghouse Electric Corp.
East Pittsburgh, Pa.

Fig. 1—This 44-inch blooming mill now rolls 20 per cent more steel per hour as a result of a modern electrical control system

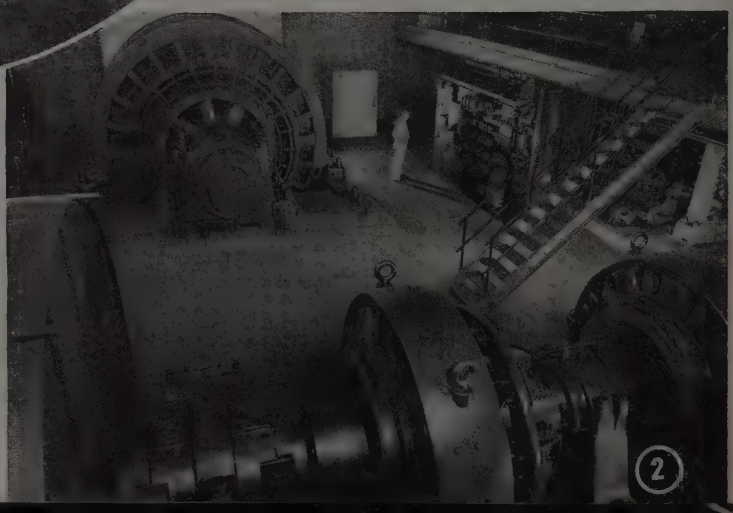


Fig. 2—Flywheel motor-generator set in foreground supplies power to the 26-year old reversing mill motor in background for driving 44-inch blooming mill

REPLACEMENT MODERNIZATION REHABILITATION

of Plant Equipment

IN addition to the numerous major projects designed and constructed by McKee in recent years, this organization has handled a wide variety of contracts for miscellaneous Iron and Steel Plant work.

This classification includes blast-furnace and stove relining, modernization of existing units, repairs of all kinds, steel mill foundations, miscellaneous steel plant buildings and structural work, secondary centrifugal dust catchers, stoves, thickening, sludge handling, fine gas cleaning and distribution equipment.

Aside from major projects, McKee has handled separate contracts totalling in excess of 20 million dollars for the types of work listed above.

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the time required for handling the ingot between passes and reversal of the motor is almost entirely a loss as far as production is concerned. As this time represents a surprisingly high percentage of the total for a rolling schedule, it is possible to obtain a considerable increase in production by the simple expedient of reducing the reversal time. This is done by increasing the rate of acceleration and deceleration of the motor to the maximum permitted by mechanical limitations.

Mill Reversal Time: This can be materially reduced by increasing the rate of magnetic flux changes in the motor and generator field circuits. To accomplish this, high field forcing, on the order of 300 to 400 per cent, is required. This means the field voltage during periods of reversal will reach a value of 300 to 400 per cent of the final steady-state value. This excess in excitation voltage forces the additional current through the sluggish motor and generator fields and speeds up the flux buildup.

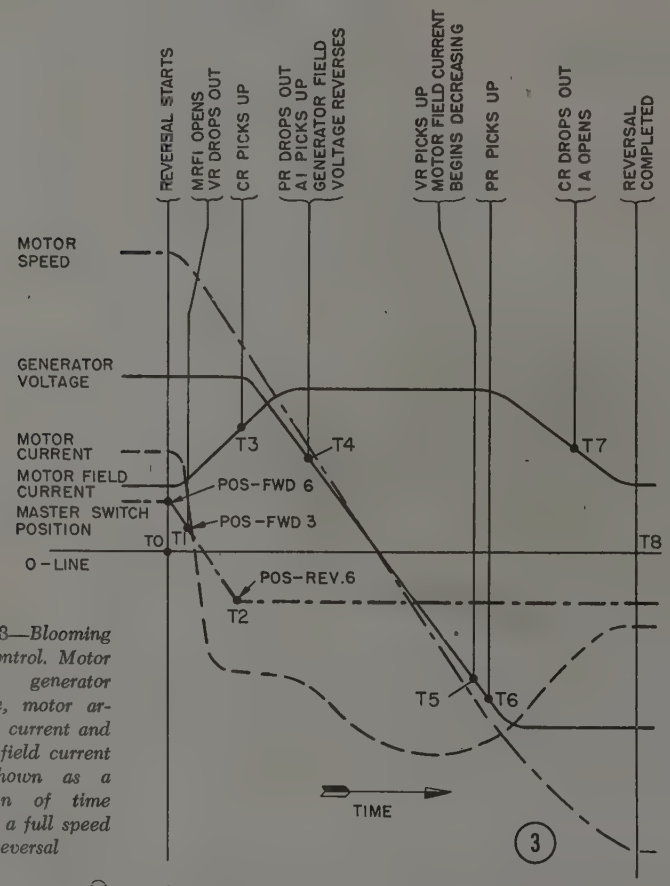
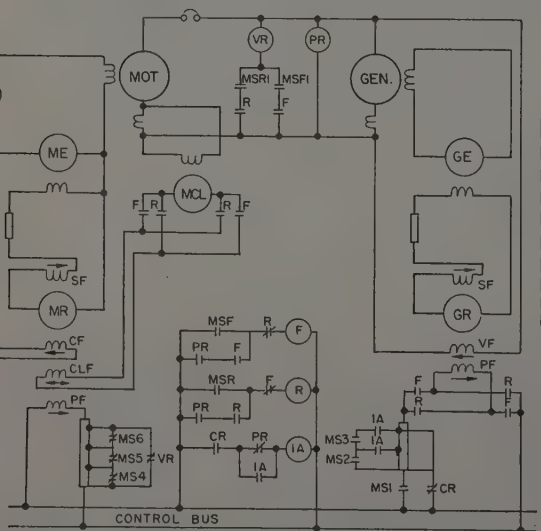
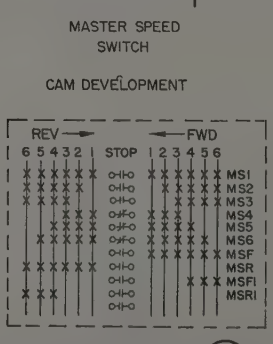


Fig. 3—Blooming mill control. Motor speed, generator voltage, motor armature current and motor field current are shown as a function of time during a full speed reversal





MASTER SPEED SWITCH

CAM DEVELOPMENT

LEGEND

ME—MOTOR EXCITER
GE—GENERATOR EXCITER
MR—MOTOR ROTOTROL
GR—GENERATOR ROTOTROL
F-R—GENERATOR FIELD REVERSING CONTRACTORS
IA—GENERATOR FIELD RELAY
PR—PLUGGING RELAY
CR—MOTOR FIELD RELAY
VR—VOLTAGE RELAY
MS—MASTER SPEED SWITCHES

Separate exciters, capable of the required field forcing, are installed for the motor and the generators. Control of the exciter voltage to maintain the accelerating torque at maximum possible value without exceeding a safe motor armature current is obtained by Rototrol rotating regulators. A simplified schematic diagram of the modernized mill control is shown in Fig. 4.

Motor Rototrol (MR) and generator Rototrol (GR) shown in Fig. 4 are fundamentally similar in design and theory of operation to a standard direct-current generator. Instead of a single field winding, they have a number of field windings which are connected in various ways in the electrical circuit. These function entirely through the interaction of these fields and give unvarying and trouble-free service indefinitely with minimum attention. They have a self-energizing field (SF) so adjusted or "tuned" that it produces the necessary ampere-turns required to maintain any voltage on the straight part of the saturation curve for steady-state conditions. The net ampere-turns of the other fields, therefore, approaches zero under these conditions. During transient conditions, when the net ampere-turns assume a definite value, the Rototrol, through function of the self - energizing field, produces a highly amplified corrective action to reduce the net ampere-turns to zero again. To obtain fast response, field poles and frames of the Rototrols and of the exciters are laminated.

General Control Scheme: Excitation for the motor and generators, shown in Fig. 4, is supplied by separate exciters, ME and GE, which are energized by the two Rototrols, MR and GR. The generator Rototrol functions as a voltage regulator and serves to raise or to lower the generator voltage quickly to the desired value and to maintain it at this value independent of the loading. The voltage is a function of the ampere-turns of the pattern field PF which is controlled by the master switch contacts MS1, MS2, and MS3, and reversing contactors F and R. Following a change in the pattern field ampere-turns the Rototrol functions through the generator exciter to force the generator field and raise or lower the generator voltage until the ampere-turns of the Rototrol's differentially connected voltage field VF again equals the ampere-turns of the pattern field.

The motor Rototrol acts as a current regulator and serves to regulate the mo-

Fig. 4—Elementary schematic diagram for Rototrol blooming mill control. Only one generator and motor armatures are shown

Making molehills out of mountains

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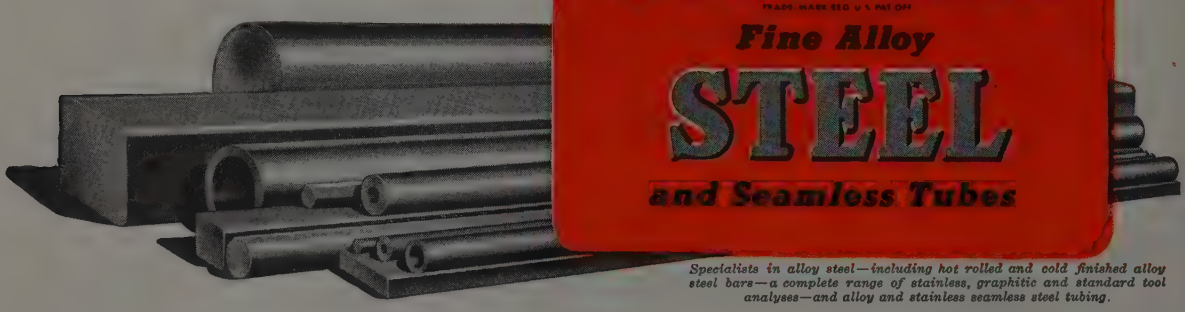

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

tor field current as measured by the Rototrol current field CF. The pattern field PF is controlled by master switch contacts MS4, MS5 and MS6 and the Rototrol functions to force a change in the motor field current and, consequently, in the motor field flux until the ampere-turns of pattern and current field become equal. The Rototrol field CLF is energized by a special current-limit Rototrol MCL which is a direct-current generator with specially designed pole pieces with magnetic shunts. The Rototrol field is connected across the motor commutating and compensating poles so that the field ampere-turns is a function of the motor armature current. Due to the magnetic shunts the Rototrol produces a voltage which is practically zero until the field current reaches a value sufficient to saturate the shunt. For higher field currents the voltage builds up quickly as a function of the current increase and energizes field CLF of the motor Rototrol.

The purpose of this field, which is connected differentially to the pattern field, is to limit to the safe value the regenerative current produced by the motor when reducing the motor speed by increasing the field current, which is the first step of the reversing procedure. When the regenerative current exceeds this value the Rototrol current-limit field CLF becomes energized and opposes the change in the pattern field ampere-turns resulting from rapid operation of the master switch. This slows up the change in motor field current sufficiently to limit the regenerative current to the desired value.

In the motoring direction the current-limit Rototrol reverses polarity, and the resulting current in the motor Rototrol current-limit field CLF assists the pattern field effect whenever the motor accelerating current exceeds a safe value. As a result, the motor excitation is strengthened, causing a needed increase in motor torque without exceeding this current value.

How Control Functions: Assuming that the mill motor is running at high speed in the forward direction and that a motor reversal has been initiated by rapid movement of the master speed switch to the extreme reverse position, the control must function in the following sequence to obtain reversal in minimum time and with minimum shock to the equipment:

1. The motor field current must be increased to nearly its maximum value while maintaining maximum generator voltage.
2. The generator voltage must be decreased to almost zero while maintaining maximum motor field current.
3. The generator exciter voltage must be reversed to initiate build-up of the generator voltage in reverse direction. Full motor excitation to be maintained until the generator voltage reaches close to its maximum value.
4. The motor field current must be reduced to its full speed value.

To obtain this sequence of operation the following relays are required:

BUILDING COST CUT: This combination of steel structure and concrete block foundation walls for a truck rental garage in Pittsburgh was erected with a reported 40 per cent savings in cost. The savings were in reduced labor and in the steel roof, according to R. G. Mayberry, Pittsburgh, owner, and Blaw-Knox Co., also of Pittsburgh, manufacturer of the insulated building. Steelwork was erected in 2½ days, erection being facilitated by preassembly into panels at the factory. Building has a 40-ft width in a single span and is 104 ft long

Relay CR—This is a current relay in the motor field circuit which serves to maintain maximum generator voltage during reversals until the motor field current approaches its maximum value. The relay picks up at 75 per cent of full field current.

Relay PR—The purpose of this plugging relay is to prevent actual reversal of the generator voltage until the voltage has been reduced below a certain value. The relay drops out at approximately 50 per cent of maximum generator voltage. The "make" relay contacts are connected in the holding circuits of field reversing contactors F and R and prevent one from dropping out and the other from closing, after reversal of the master switch, until the relay drops out.

Relay VR—The relay coil is connected across the generator armature in a circuit with master switches MSF1 and MSR1 and field reversing contactors F and R. The relay is picked up for normal full speed operation through contacts MSF1 and F. It drops out as soon as the master switch is reversed and MSF1 opens. It picks up again, after reversing contactor F opens and R closes, when the generator voltage reverses and reaches 80 per cent of its maximum value.

Reversal Sequence: To obtain a better picture of the functioning of the control equipment, a step-by-step description of its behavior during a full speed reversal follows. Variations in motor speed, generator voltage, motor armature current, and motor field current during this period is illustrated in Fig. 3. It is assumed that the motor is running at full speed forward with maximum voltage and minimum motor field current. Master switches MS1, MS2, MS3, MSF and MSF1 are closed.

Time T_0. Start movement of master switch to reverse direction. Master switches MS4, MS5 and MS6 close, causing an increase in motor field current and a decrease in motor speed.

Time T_1. Master switch MSF1 opens and de-energizes relay VR. The relay drops out and its contact closes to maintain full motor excitation when master switches MS4, MS5 and MS6 again open. The motor armature current drops to zero and reverses. It is during the following period that the regenerative current peak is limited through the action of the current-limit Rototrol.

Time T_2. The master switch movement is completed. Switches MS4, MS5, MS6, MSF, and MSF1 are open, and switches MS1, MS2, MS3, MSR, and MSR1 are closed. Field contactor F remains closed, however, because plugging relay PR still is energized. The motor field current still is low, and relay CR is open. The relay's "break" contact, therefore, is closed to maintain full generator voltage. Field relay 1A is open.

Time T_3. The motor field current reaches the pick-up value for relay CR. Its "break" contact opens and reduces the pattern field current of the generator Rototrol causing a reduction in the generator voltage. Field relay 1A remains open because plugging relay PR still is picked up and its "break" contact in series with the field relay coil is open.

Time T_4. Generator voltage is reduced and plugging relay PR drops out, causing field contactor F to drop out and contactor R to pick up, thereby reversing the pattern field of the generator Rototrol. At the same time field relay 1A closes so that maximum reverse voltage will be applied to the pattern field. The resulting powerful forcing causes quick reversal of the generator voltage and buildup in the reverse direction.

Time T_5. Voltage relay VR picks up, causing a reduction to its minimum value of the motor Rototrol field current and a corresponding decrease in the motor field current and increase in motor speed.

Time T_6. Plugging relay PR picks up with no immediate effect.

Time T_7. Relay CR drops out due to the reduction in motor field current and de-energizes field relay 1A. This, however, does not change the generator Rototrol pattern field current because the back contact of relay CR closes at the same time.

Time T_8. Reversal is completed.

After installation of the new exciters, Rototrols and control equipment on Mar. 6, 1946, the reversal time from base speed in one direction to base speed in the other direction of the motor armature was reduced to 1.7 seconds. As a result of the fast reversal time, the mill output was increased from approximately 162 tons per hour to almost 200 tons per hour. At the same time the regenerative current peaks were reduced from 6000 to 4000 amperes, and the motoring current peak from 10,000 amperes to 6500 amperes with an occasional 7500 amperes top. There has also resulted a marked improvement in the commutation of motors and generators.

Special Cutters

(*Continued from Page* 91)

sent along. In event of a very special job, it may even be necessary for the company to dispatch its own engineers to the plant of the customer for consultation with the latter's engineers.

In a majority of the cases here, tool orders clear through the engineering department in a matter of 2 or 3 days, depending on the job. For some of the more complicated tools, it may take 2 or 3 months of engineering to iron out all details. Another contributing factor for such a lag may be a matter of very special materials, although the company makes every effort to anticipate all requirements. For example, bulk of the special tools is made from 18-4-1 steel which is kept in long supply at all times. This is stocked in form of round or flat bars, sheets and forgings. In some instances, special shapes are kept on hand, in others, the more special materials must be located. Most tools, however, are processed from forgings on hand, and the company has had very little trouble in locating "ultra-special" materials.

Difference between generating tools and nongenerating tools is as wide as the difference between a miller and a planer. A hob, for example, is a form of milling cutter with helical teeth arranged like a thread on a screw and with flutes to provide cutting edges. In cutting teeth of worm, spur, helical or herringbone gears, the hob rotates together with the blank in which the teeth are being generated. The tool used in the planer, on the other hand, is designed to make a sweep across the work piece to remove metal.

In most plants turning out cutting tools, specialists are employed to design one type or the other. At National Tool, the engineering department, to handle this phase of the work, is divided into two sections called the generating and nongenerating departments. Although a chief engineer heads the department, each section is under the direction of an assistant chief engineer who is a specialist in his field.

Lays Out Production Sequence

Once an order clears engineering, it is sent directly to a department, referred to as the "standards" section. This is more or less a key department so far as actual creation of the tool is concerned. Its function is to lay out the "production" sequence of the contemplated tool from start to finish. It determines what machines are to be used during the processing, when the particular part is to be heat treated, what inspection tests are to be used, how much time is to be allowed for each operation — estimating fairly accurately beforehand how much it will cost the company to produce the cutter.

Sometimes, in creating a special tool, an unusual jig, fixture or another special tool may be required for one of the operations. In this event the standards department requests engineering to design the device to be made. The order then is not released for processing until these are built, and all other factors in the production sequence are straightened out.

When, however, the job is finally released, it is in form of a detailed chart, as shown in Fig. 16 This lists date the order was received, name of the cutter to be produced, and refers to the engineering drawing concerned. As shown, it also lists which departments are to handle the tool while being processed, operators concerned, amount of time that is to be allowed for setting up each machine for its operations and how much time each piece is allowed for the operation. It also points out the operations required at each machine and who is to inspect the work after each operation. Copy of this chart also is sent to production control where operations of the cutter involved are noted on a visual production control board. The latter serves the company much in the manner a baseball scoreboard serves spectators at a ball game. Each time an operation is completed on a cutter, production control is notified and progress of the work is indicated on the board by pulling out a red tab. With the setup, it is a simple matter to spot or trace a cutter in the plant, even though an average of 2500 orders are processed at one time.

Another important function of this department is to back up the sales department in making quotations. If an order is comparatively easy to fulfill, the sales department can easily provide a quotation based on past experience on similar orders.

If the order, however, calls for the creation of an entirely new type of cutter, the quotation is fixed by the standards section which again draws on experience and its knowledge of equipment and materials to make a cost estimate. Thus regardless of whether the order calls for surface broaches, form relief cutters or other special tools including carbides, very few spot quotations are made. Most of them are based on actual know-how gained through long experience.

After the order is finally processed through the above initial stages, it is ready for production. It is here that operator skill and know-how really count, in addition to ability of following instructions as outlined by both the engineering and standards departments. Depending on the cutter to be produced, there may be only a few operations or many complicated ones. Some 17 to 25 or more separate operations may be necessary to produce a helical gear

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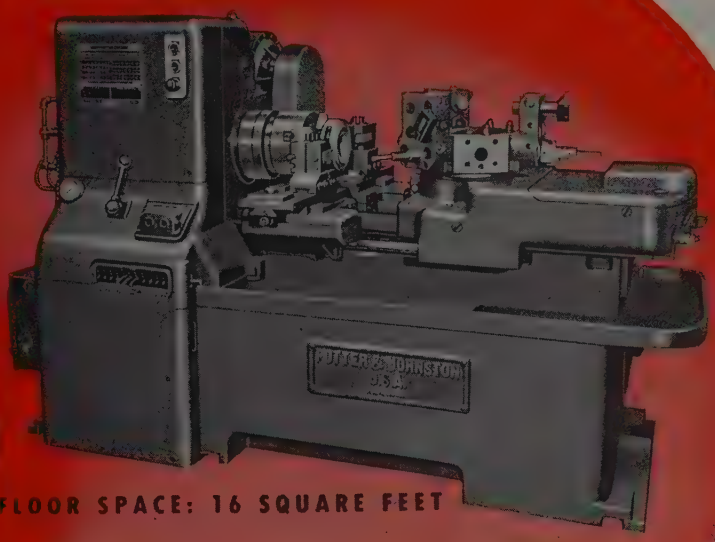

FLOOR SPACE: 16 SQUARE FEET

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can it increase production at lower unit cost?

With the **3-U** *Automatic Turret Lathe, we say "Yes!"*

Greatly increased hourly pay of machine operators upsets time study men and shakes up cost accounting. One method whereby operations can be profitably balanced is to use a machine that INCREASES PRODUCTION AT A LOWER UNIT COST. P. & J. Automatic Turret Lathe, newest addition to a long line of automatics designed for profitable production, is built to give the HIGHEST PRODUCTION PER OPERATOR. Known as the 3-U Automatic Chucking and Turning Machine, it is another demonstration of superiority over hand machines, both as regards to the quality of the finished product and increased output, as well as to a corresponding reduction in the labor costs for producing the work. There are 48 changes of speed between 36-711 RPM and 73-1445 RPM. These speeds are arranged in six sets of four automatic changes. The feed gearing is driven from the spindle, causing the feeds to vary directly with the spindle speed.

There are 24 feeds arranged in geometric progression, and there are three automatic variations of feed. The P. & J. 3-U Automatic is not an experiment: it is a full-fledged member of the P. & J. line of automatics, already living up to its manufacturers' claims on the industrial firing line.

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Potter & Johnston Machine Co., Pawtucket, R. I.

shaper cutter. This does not include heat treating and the inspections to which the part is subjected. Incidentally, the Cleveland firm follows the practice of decentralized inspections. Inspection equipment is spotted within convenient reach for each operation and only on completion of each operational inspection is the part deviated to the inspection department for a complete double check.

An idea of the processing involved in producing a cutter during the "production" phase may be obtained by following the sequence of operations necessary on a typical helical gear shaper cutter.

Producing a Cutter

In most cases the work, in form of a forging, is delivered to a turret lathe for the first few preliminary operations. These include a facing cut that consists of shaving off the back face of the piece; a turning operation in which the forging is subjected to the cutting action of a carbide tool that "whittles" the outside diameter to the proper dimension, and a boring and counterboring operation.

Immediately following these initial steps the work is taken to the hobbing machine where, as the teeth are generated, it first begins to shape up as a cutter. In the tooth cutting operation, the hob—one of the company's own products—is set to allow enough grinding stock for future regrindings. Amount of stock left on each tooth varies between 15 to 20 thousandths. Next step in the sequence consists of a stagger tooth operation which is performed on a universal miller. The staggered teeth enable the cutter to enter the work in the proper cutting position.

If instructions issued by the standards department call for heat treating, it is at this point that the new cutter is deviated from the machining sequences and sent to the heat treating department. Here it is hardened and tempered, then checked for hardness. During the tests, it may be subjected to either a rockwell, brinell or scleroscope test. It also is given a thorough visual going over to detect any defects that may have resulted from previous operations, or those that show up following heat treating. For example, a cutter may seemingly be in first class shape when in the "soft" state or before being hardened. Following the hardening process it may show some very definite cracks—cracks that were undetectable while the work was in the "soft" condition. On "large" orders where many cutters of the same type are being processed, two or three of these are usually spot checked for cracks by subjecting them to a magnaflux test.

While on the subject of testing, it may be pointed out that the work is subjected to an inspection between each of its machining sequences, being doubly inspected, immediately following the more complicated precision operations, by the inspection department—before proceeding to the next step in the machining sequence.

Upon returning from being heat treated, the gear shaper cutter then begins its "last-mile" march through the remaining machining operations. During the "march" the back face of the cutter is ground and lapped; the cutter then is sent to a hole grinder where the hole is ground to the dimensions specified. The web also is faced at the same time during this operation. The cutter is next taken to a surface grinder and later to an external grinder. The surface grinder rough sharpens the front face of the teeth. The second machine merely rough grinds the outside diameter of the teeth.

More work is done on the involute form of the tooth directly after the external grinding. Two special involute grinders, specially designed and built by the company, are involved in these operations. One performs the roughing operation and the other completes the finishing operation. Profiles of each tooth are held precisely to the dimensions and tolerances specified by the engineering department.

Final Steps of Sequence

Outside diameter of the cutter is then finish ground until proper chordal thickness of the teeth is reached. This operation is followed by one in which the corners on top of each tooth are either rounded or chamfered. Final steps of the sequence involve finish sharpening the front face of the tool.

Mention was made previously of one of the most familiar uses of special cutters—that of shaping gears. The cutter used to produce the gears for the rolling mill is a blood-relative of those metal formers that form gears for automotive transmissions, steam shovels, blast furnaces, cranes, sheet galvanizing machines and many other applications. Although differing in dimensions, and even slightly different in shape, the gears are all of the same family group. Some are straight standard gears while others are modified in accordance with the work they are to do and the special cutter being used.

Fig. 14 shows a continuous tooth herringbone gear similar to many used in the steel industry. Here it is shown being cut with a National cutter in the Horsburgh & Scott plant in Cleveland. Gears such as this herringbone unit may be used on a blast furnace distributor, otherwise known as a revolving top; or in the control box of the skip hoist which controls the cars that carry the materials to the blast furnace.

Until very recently it was necessary for manufacturers of continuous tooth herringbone gears to first cut the gear with herringbone gear sharper cutters, and then chamfer the top corner of the gear teeth by filing. This lengthy and expensive operation is now eliminated by using one of the latest herringbone gear shaper cutters developed by National Tool, shown in Fig. 5. As indicated in the illustration, feature of this cutter is a modified tooth form which produces the desired chamfer at the same time the tooth in the gear is being cut. Solid line of the drawing shows the cut produced by the new cutter while dotted ones indicate the portion previously chamfered by filing.

Use of Pinion Gears

Pinion gears shown in Fig. 13 are close relatives of those shown in Fig. 14. They are used on a 44-inch blooming mill, and are cut on a generator of the planer type developed by Dominion Engineering Works of Canada, STEEL, p. 120, Apr. 14, 1947. The equipment cuts continuous herringbone gears up to 20 feet in diameter and with 66-inch face widths. Each pinion represents some 280 hours of cutting with the machine being adjusted to take ⅛-inch cuts.

Figs. 10, 11 and 1 respectively show a different type gear shaper finishing cutter used by Caterpillar Tractor to generate the gear used in its tractor units; two views of a special 7 diametral pitch gear shaper cutter indicating amount of service that may be obtained from one of these cutters; and three master gears used to check the precision gears shaped by the gear cutting tools. According to the Cleveland cutter producer, the tremendous speeds at which gears sometimes operate make it essential that they be as nearly perfect as possible. While highly efficient manufacturing methods are in use, it still is necessary to check each gear. Such characteristics as eccentricity, tooth profile, center distance and tooth spacing are checked with master gears. The company makes these master gears from 1 to 100 diametral pitch, those in Fig. 1 indicate visually the range that is handled.

Worm gears are employed widely in the metalworking industries. In the steel mill they are used in the screw down for adjusting the tension of rolls. They are found in mechanical lubricating equipment for feeding grease in stuffing boxes, or in mines—in giant sizes— acting as conveyors in moving coal from one place to another. They also are included in machine tools, aircraft landing gears, pipe-cutting machines, speed reducers, truck and bus rear-end drives.

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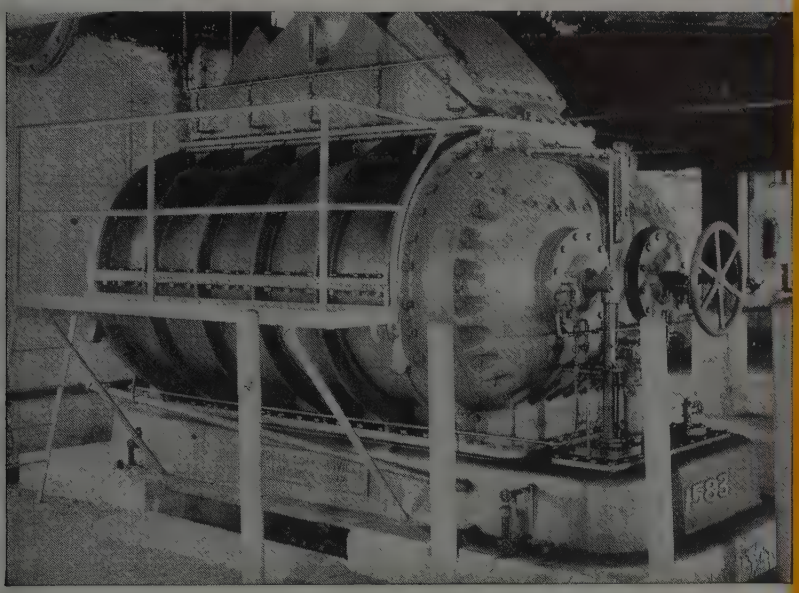

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...keeps his distance
on a HERCULES*
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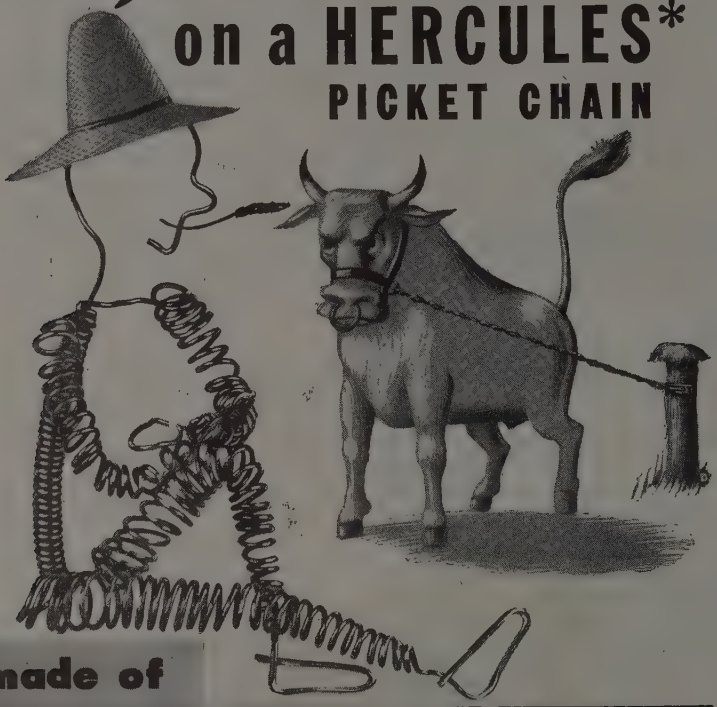

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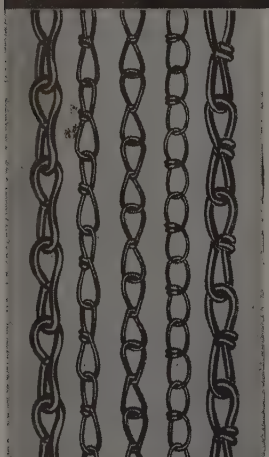

While most chains are not stronger than the weakest link, Hercules chains are not weaker than the strongest bull. Just let any onery, frisky critter get on the end of a well-anchored Hercules picket chain made of 8-gauge Keystone wire, and you know he'll stay put.

Or, if you need lighter chain for your dog, porch swing, hammock, well pump, boat tie or any other use, you can look to Hercules for the exact type of chain you need. A complete line is offered — all made of quality Keystone wire.

A long list of industrial firms are using Keystone wire in their products. Whatever your wire needs, Keystone can normally supply them.

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automotive, marine steering elements.

In generating a worm gear, standard practice among manufacturers is to employ a hob as the cutter. The hob used varies in accordance with type of worm gear desired. If full depth contact of the worm is desired—in cases where heavy loads are involved—the hob must be made with thinner teeth than those required for a worm that is used for lighter loads. Generally speaking, a hob is a duplicate of the worm.

In making worms, two methods are commonly used in the process. One involves the use of a worm thread milling cutter where a rotating cutter approaches the work and rotates with it to cut the thread specified for the worm. Fig. 12 illustrates the second method—one of the fastest used in generating a worm. Here a worm generating cutter designed by National Tool is used for the job involving SAE 1040 steel in the plant of Ohio Gear Co. Finish produced is of such nature that no other finishing methods, including lapping, are required. The work revolves at speeds of 300 revolutions per minute under a constant flow of lubricant. This method of generating worms is commonly used to cut threads from 6 to 48 diametral pitch.

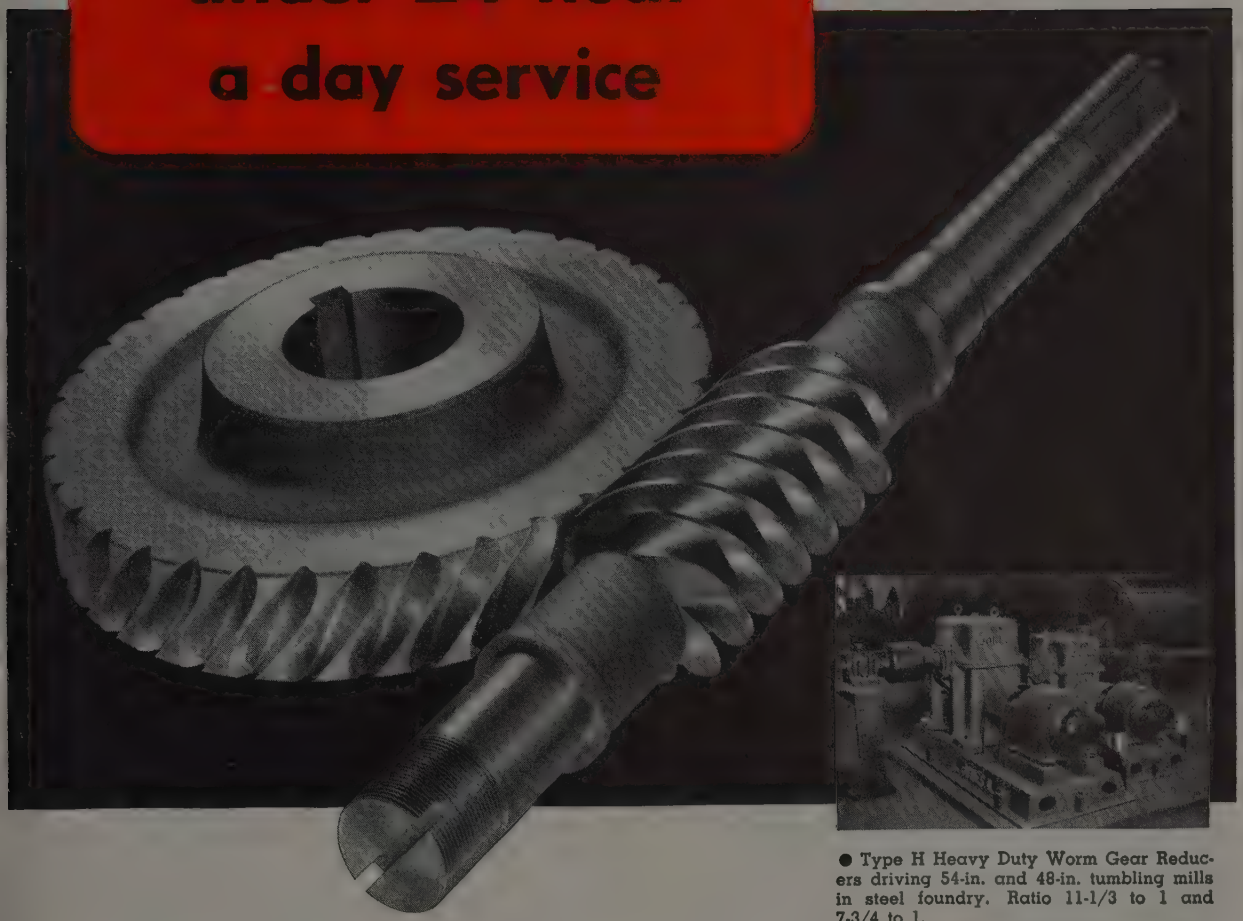
Uses of a Hob

Hob shown in Fig. 4 is used to generate worm gears. It is a special ground form multiple start tangential feed worm hob. With modifications of design and also size, hobs also can be used for cutting such gears used in special fourth-speed transmissions of vehicles; for continuous hobbing of spur gears and pinions employed in small precision instruments such as meters, clocks, watches, cameras and motion picture apparatus. Fig. 9 is a comparison between a 1¼-diametral pitch unground form hob with one of 32 diametral pitch. The special ground form spline hob shown in Fig. 2 along with a test cut produced by the tool, is used extensively by the Lima Locomotive Works in Lima, O., for cutting splines. This particular cutter is used to form splines 5 inches in outside diameter, shaping 10 splines in SAE 4140 steel with a brinell hardness of 225 to 265. With this tool a spline is finished completely in one cut, the hob generating at 45 revolutions per minute with a feed of 0.009-inch per revolution.

Gang milling is the term applied when two or more cutters are used in an operation. When the cutters are designed with much finer teeth—resembling those of a saw—and combined in twos or more on a single arbor for an operation, the term applied is gang sawing.

Thus the special cutter shown in Fig. 8, is known as a gang of saws. It really consists of 34 saws mounted on an arbor

Built to stand up under 24 hour a day service



● Type H Heavy Duty Worm Gear Reducers driving 54-in. and 48-in. tumbling mills in steel foundry. Ratio 11-1/3 to 1 and 7-3/4 to 1.

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For complete information on Jones Worm Gear Speed Reducers ask for Bulletin No. 68 and for Worm-Helical Reducers ask for Bulletin No. 75.

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● Jones Worm-Helical Speed Reducer driving a lacquer agitator. A simple design prevents leakage of oil along the vertical low speed shaft.

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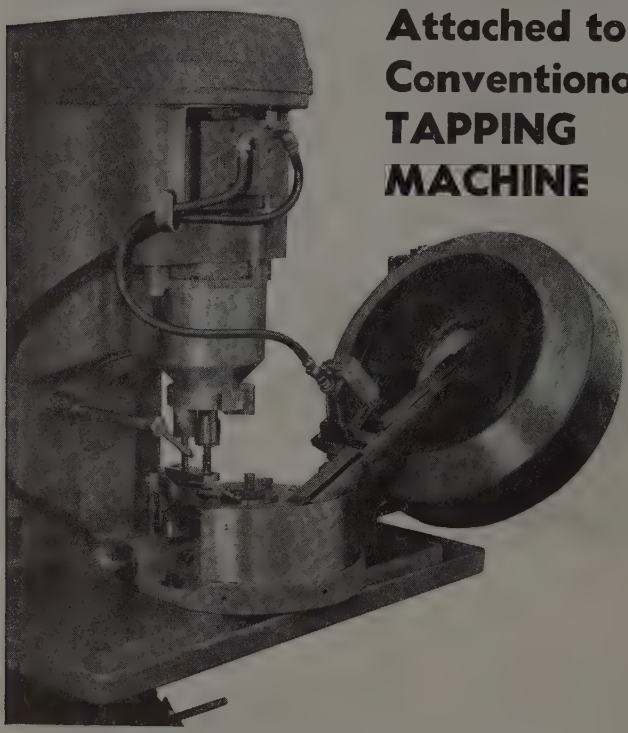
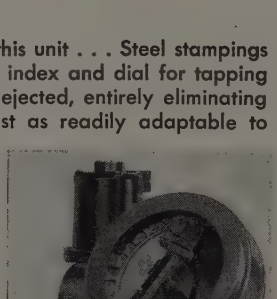


Here is another example of the wide versatility of this unit . . . Steel stampings are automatically selected and fed to air-operated index and dial for tapping operation, after which the parts are automatically ejected, entirely eliminating manual handling of parts. This application is just as readily adaptable to drilling or punch press operations.

The hoppers are completely motorized, and are self-contained units. They are made in four sizes: 10", 12", 16" and 24" diameters.



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DETROIT POWER SCREWDRIVER CO.

2811 W. Fort Street
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with a spiral keyway. Such a tool is used in a milling machine on work that requires a number of related surfaces to be finished. Each of the 34 cutters works simultaneously, machining its particular part of the work.

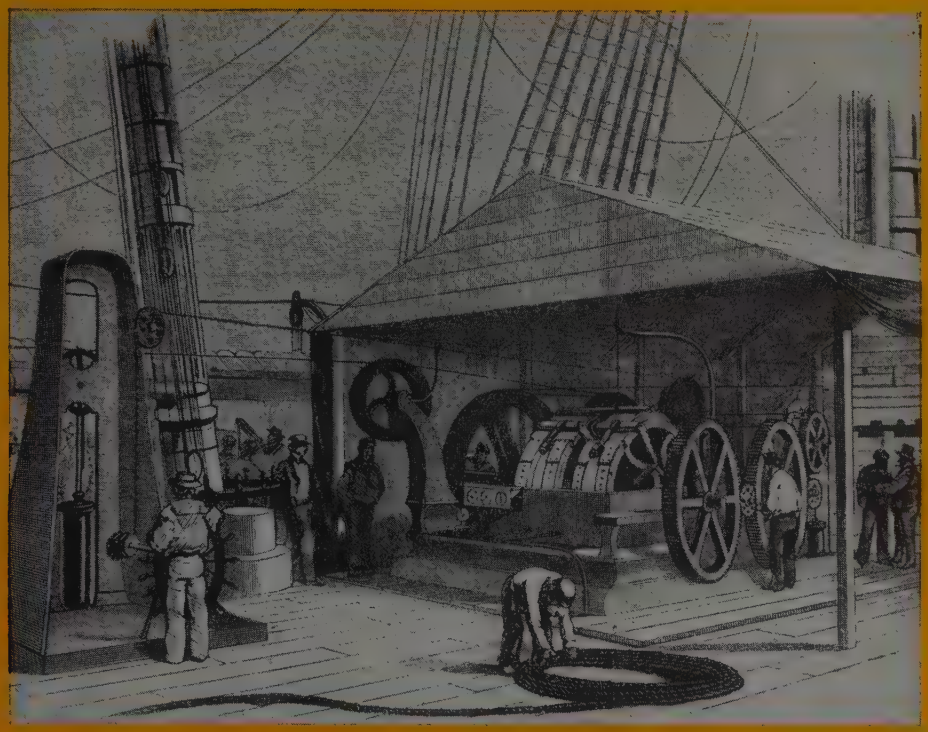
Illustrated in Figs. 3, 6 and 7 are three other special tools manufactured by the company for use on milling machines. The one in Fig. 7 is an 18-section form relieved cutter for milling ratchet teeth in automotive jacks. Incidentally, to clarify a form relieved cutter, perhaps a simple definition is in order. A form relieved cutter is one made like other rotary cutting tools except that it is sharpened by grinding the cutting face of the teeth while the outline of the teeth maintain the original form.

Uses of Special Cutters

Ground form, form relieved cutter indicated in Fig. 3, is used by American Locomotive Co. in the manufacture of turbocharger blades. In action, this special tool completes about 150 pieces before requiring regrinding, with the machine on which it is used running at 105 revolutions per minute. Cutter is fed to the work at a speed of 1.9-inch per minute, removing about 0.020-inch stock. The other special cutter, Fig. 6, is an interlocking form relieved cutter that consists of five sections. It was designed by the Cleveland company for milling bronze impeller blades for the blowers manufactured at the Indiana plant of Roots-Connersville Blower Corp. It is used on a Cincinnati miller, the stock being fed to the cutter at a speed of 3½-inches per minute. The cutter removes about 6 pounds of stock every 2½-minutes. In one cut, the cutter removes about 0.250-inch of stock, leaving a tolerance of plus or minus 0.001-inch. Some 20 gallons of coolant per minute is used during the operation.

Broaching is a method of removing metal by means of a toothed cutter which is pulled or pushed over a surface or through a hole, finishing it to accurate dimensions and contour desired. The cutter teeth can assume various shapes, depending on the work they are to do. In certain applications, a broach is instrumental in saving many operations. For example, at one company, Vlchek Tool Co., Cleveland, production of the common pliers, frequently found in the automobile tool kit, was increased about 50 per cent by employing broaches in place of a former milling operation. The pliers are high grade carbon steel forgings, and are broached on a 90-ton press with a 10-inch stroke. Forgings are fed from a magazine loader and broached at the amazing speed of roughly 33 per minute or better than 2000 per hour. In addition, the company

MILESTONES IN AMERICAN INDUSTRIAL DEVELOPMENT



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When this Cable linked two Continents—"STANDARD" products were a link in Industrial Production

This paying-out machine installed on the Great Eastern, largest ship of her time, laid the first completely successful Atlantic cable in 1866. Some years previously a cable had been completed between Ireland and Newfoundland, but had operated only three months. The new cable produced the first great change in man's outlook on international affairs, made yesterday's happenings on one continent the breakfast news on the other.

In this same period "Standard", which had already served industry for almost three-quarters of a century, installed the third Bessemer converter in the country. It was housed in a building still standing and in use. A tire mill and a ten-ton double acting steam hammer were imported from England to equip the new plant

Today the "Standard" tire mill contains three units, with a total capacity of 2300 pieces per week Rings of practically all sizes up to 12 feet outside diameter can be rolled. The wheel rolling mill can turn out over 2000 pieces per week, and the forge shop has an annual output capacity of 15,000 tons of locomotive forgings, and 30,000 pounds of heavier miscellaneous forgings.

These completely modern facilities, plus control that covers every operation from initial melt to final operation, assure top quality and uniformity. When you need forgings or castings, "Standardize on Standard." The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U. S. A. Offices Philadelphia, New York, Boston, Birmingham, Houston, St. Louis, Chicago, Cleveland, San Francisco, Seattle, Washington, Pittsburgh, Detroit

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These are the kind of tests Brooks Engineers welcome—for a thirty-day period each application of the previous lubricant was carefully weighed before application and positive reports filed. Then, for a thirty-day period Brooks Klingfast Special was given the same exhaustive tests, with these results:

- The initial cost of *Klingfast Special* was about 20% less than the previous lubricant used.
- Klingfast Special required only one-half the amount per application.
- Each application provided safe protection longer by 4 times.
- No heating is required for *Klingfast Special.*
- Actual proven cash savings are $2250.00 monthly in addition to considerable savings in man-hours of application time.
- Similar results are being reported by cement plants, aluminum plants, underground and strip mine operations and many other industries.

As a result of this amazing performance *Klingfast Special* has been made the standard specification for a number of plants owned by this firm.

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PRODUCTS OF ENGINEERING AND RESEARCH ON THE DIFFICULT LUBRICATION JOBS OF INDUSTRY SINCE 1876

states, the broaches produce about 45,000 pieces each time they are serviced by grinding. Often they can be resharpened some 13 to 15 times during their life-span.

A specialty at National Tool is the production of all types of flat and sectional broaches, similar to the one shown in Fig. 15. One of the special broaches the company supplied Caterpillar Tractor Co., machines about 100 front idler bearings per hour. During this operation the cutter provides a tool life of about 650 pieces per grind. Another special broach being used by Houde Engineering Division of Houdaille-Hershey Corp., to broach the wing shaft of a shock absorber, machines the shafts at the rate of 350 to 400 per hour from EE steel to Ford Motor Co. specifications.

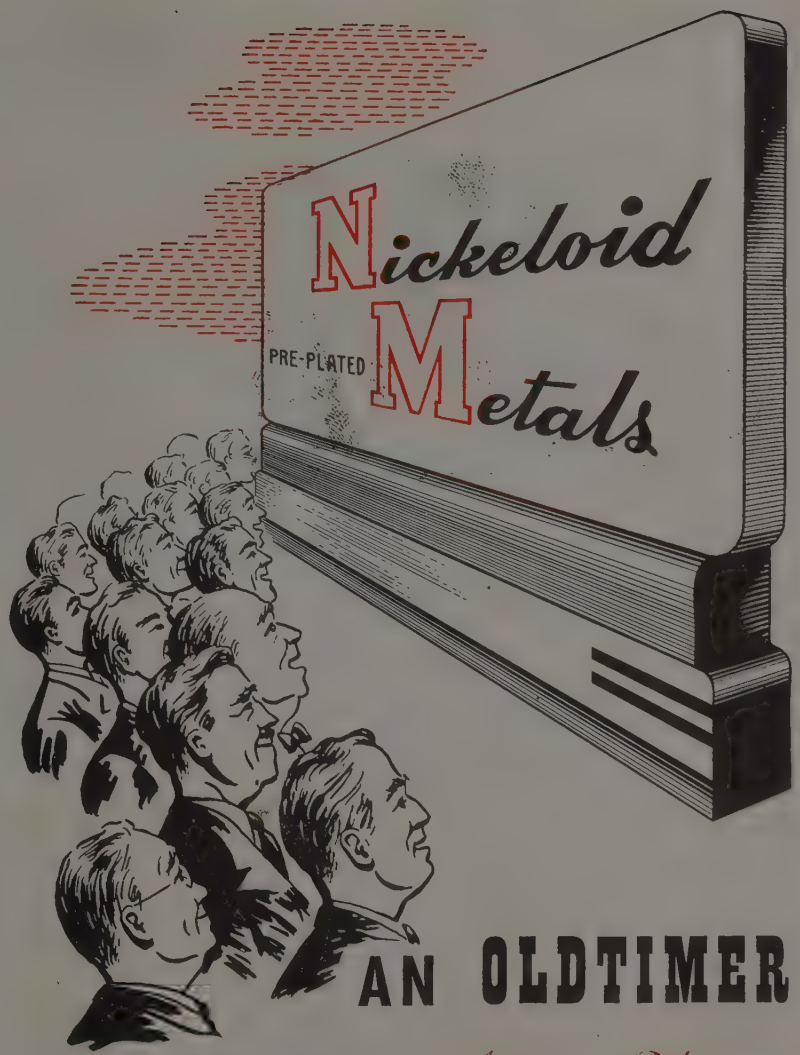
Broach inserts shown in Fig. 15, are high speed steel sections which do the actual cutting. Usually several are assembled together in one holder so that a complete contour is cut at one stroke. Tooth design in the inserts is particularly important. The teeth must be strong enough to withstand cutting force, and spaced to allow chips to be carried away easily. Whenever possible, inserts also are designed to take a shearing cut—the teeth should be on a slant and not present the whole cutting edge of the tooth to the work at one time. By making a shearing cut the broach produces a better finish and does not chatter.

Reason behind a sectionalized broach is that the sections are comparatively easy to manufacture and replace. Another reason for breaking down a broach into sections is that if slight changes are required in the cut, these can easily be made by altering the relative positions of the inserts by means of shims or plating.

From this account it can be seen that the special cutting tool industry, born as a job department in the plant of many enterprises to supply required cutting tools, is today recognized as a separate specialized industry. It is one that requires specialists in all phases of cutter production—whether it's designing, heat treating, grinding or metallurgy; one that provides users with specialist know-how to overcome the many obstacles of forming metals to precision tolerances, and of fashioning complicated shapes.

—o—

Copies of Simplified Practice Recommendation R184-47, Iron Valves, are now available, reports the Commodity Standards Division of National Bureau of Standards, Washington 25, D. C. First issued in 1942, the recommendation applied to the usual types of iron gage, globe, angle and check valves for primary pressures of 25, 125, 150 and 250 pounds and 100 and 800 pound pressures of water, oil and gas.



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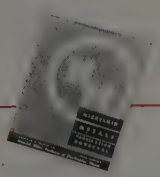

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When a hippo cuts its teeth it is possible that quite a commotion occurs. When OTTUMWA cuts teeth, however, there is no commotion; it is simply routine. They cut teeth every day—Sykes continuous tooth herringbone gears up to 10' 2" dia., 24" face, complete in steel or semi-steel, or from blanks furnished by customers. There is no argument about the efficiency of these teeth, either. OTTUMWA-Sykes generated herringbone gears, true involute, utilize every fraction of face width, give full bearing surface, and create the most efficient system yet devised for the transmission of power between shafts whose axes are parallel. OTTUMWA engineers will be glad to study your requirements and recommend the right drive for your duty. Catalog mailed on request.

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Surface Quality

(*Continued from Page* 95)

necessary or desirable. Logically, an attempt should be made to approach a condition of uniform and simultaneous progress of solidification by proper design of the cavity and correct location of the runners, gates and overflows, but the shortcomings along this line must be made up for by pressure and this pressure, to be effective, must be applied immediately after the cavity has been filled.

Wall thickness should be as uniform as possible but if there are large differences in cross-section an approach to uniform solidification can be accomplished by placing water-lines near the cavity wall at the heavy section and gating into the thinner section. Very often the arrangement of the cavity in the die block can be made to take advantage of the sprue and runner to supply extra heat to thin sections. In this way other means of heating the die, for instance with torches or electric heaters, may be dispensed with.

Cause of insufficient pressure, or late application of pressure, may be due to improper functioning of various parts of the hydraulic or mechanical systems but very often it will be found that the trouble lies in high resistance to flow of the metal due to poor design of runners and gate openings. As far as the die is concerned the pressure losses may be caused by constriction at the sprue, long thin runners, sharp bends in the runner, small gate openings or too long a land at the gate opening. Insufficient or improperly placed air vents will allow excessive back pressure in the cavity to momentarily act against the shot pressure allowing time for solidification to begin before the metal is pressed against the cavity wall.

Chills may also be due to improper location of gate opening, causing metal to flow into a section of the cavity, stop, and partially solidify before the remainder of the cavity is filled and pressure is applied. The die should be gated in such a way that all the metal in the cavity is kept moving until the whole cavity is filled. Any delay between the simple filling of the cavity, or any part of the cavity, and the application of full shot pressure will produce imperfections on the casting surfaces.

For this reason it is essential to get uniform filling rates in each cavity of a multiple cavity die since the full shot pressure cannot be applied until all cavities are filled. When the cavities are similar this merely requires exact duplication of the runners and gate openings. Examination of similar parts cast in multiple cavity dies showed that poor surface conditions were most prevalent when the size of the gate openings and

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"EXTRA"
"STANDARD"

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A carbon Tool Steel that is all that its name implies. On hardening, core can be kept soft and tough with full hardness on outside. Various depths of case, at any given heat-treating temperature, can be produced. And all factors, such as grain size, coarsening temperature, toughness and hardness of case, etc., can be controlled. Will be melted to individual user's carbon and/or Silicon specification, and, if desired, with small percentages of Chrome.

All Disston "BEST" Tool Steel must pass these tests: (1) microscopic, for cleanliness, (2) depth of hardness, according to specifications, (3) hardenability in a cone section, (4) deep acid etch for internal soundness, and (5) step-down test to show freedom of splits, seams or dirt at any depth.

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A fine quality Carbon Tool Steel that is indicated where a good, clean grade of steel with specified depth of hardness is required, but where the amount of work put on the steel or the subsurface cleanliness are not so great as to warrant the extra cost of Disston "BEST". Widely accepted for applications such as heading dies, blanking dies, punches and similar tools made in quantities, and where price is a factor. Usually stocked in the 1.00 to 1.10% Carbon range with Phosphorous and Sulphur .020%.

Tested before shipment for (1) microscopic cleanliness and homogeneity, (2) depth of hardness, (3) hardenability, and (4) deep acid etch.

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A good quality Carbon Tool Steel that is entirely suitable for the regular line of competitively priced hand and machine tools where depth of hardness is not an important factor. It is fine grained, medium hardening and clean. After heat-treatment, it shows a high degree of fatigue-resistance and a high elastic limit. May be specified in any Carbon range, but is usually stocked in .95 to 1.05%, with Phosphorous and Sulphur .020% maximum. Subjected to routine tests for surface condition and acid etch of ends of bars.

DISSTON metallurgists and engineers will be glad to help you solve any of your tool steel problems. Write for particulars.

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This 16″ x 10″ Reel Block being driven through a Horsburgh & Scott speed reducer is just one of many different types of machines and operations in steel mills where H & S has supplied equipment for transmitting power. For over fifty years H & S has furnished gears and speed reducers to the steel industry . . . designing and producing equipment that is accurate, dependable, efficient . . . built to endure.

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THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

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runners were not perfectly matched.

However, when the cavities are not similar the problem of gating for uniform filling rates becomes quite complicated. In these cases a very fast shot is sometimes necessary in order to cut down the time delay between the accomplishment of a full cavity and the application of the final maximum pressure which occurs after all cavities are filled.

Sometimes design of the cavity is such that metal must travel a long distance to fill it. Molten metal will naturally cool and become sluggish as it travels and there would be an appreciable pressure drop toward the far end of the cavity. Chills which are caused by such conditions and which persist, even after all steps have been taken to reduce the resistance to flow and shorten the travel, can often be remedied either by placing an overflow or well next to the cavity and close to the affected area or by gating into more than one section of the cavity.

However, the latter expedient may give rise to other surface defects, such as swirls, unless care is taken to place the gates so that all metal entering the cavity flows in approximately the same direction. That is, if multiple gate openings must be used they should not be placed so that the streams of metal oppose each other.

More common methods of combating the tendency to "chill" have been to raise the temperature of the molten metal, operate the die at a higher temperature, and fill the cavity with a very fast shot. Within certain limits these devices may be successful but they shorten the life of the die and contribute to the various causes for machine failure.

Splashing: Another frequent surface defect is caused by the splashing of metal particles against walls of the cavity. Heavy sections do not ordinarily "chill" but will very often show these splashes. The appearance is similar to the chill. In this case the surface is mottled with bright spots of irregular shape and size, Figs. 3 and 4. Of the castings examined, most of those which showed this defect had gate openings which were either very thin or were thinned down at the ends.

It is believed that gates of this design tend to spray the metal into the cavity rather than to flow it in in a solid stream. Gate openings should be of uniform depth across their full width and as deep as possible consistent with ease of trimming.

In certain shapes of castings the effects of spraying can be eliminated if the gate is directed into one end of the cavity with the gate opening close to that end. This is known as the back-up gate. It eliminates spraying because the gate opening is covered by molten metal at the beginning of filling. Care must be

taken to locate the gate opening close enough to the end of the cavity so that the metal in this section is kept in motion until the cavity is filled. Location of gate opening should also be such that the metal is not directed against cores or an opposing wall in such a way as to break up flow and cause particles to become deflected into various parts of the cavity ahead of the main stream.

Microscopic examination at the cross-section of some of these splashed particles indicates that they do not knit solidly to the base metal and though a light buffing is usually sufficient to mask the defect to the naked eye, the area will not plate over smoothly when subjected to the usual cleaning and acid etch.

When fine particles of the molten alloy are sprayed into the cavity at high velocities and strike a section of the cavity wall where there is little or no wash by the main stream of metal a surface defect known as "soldering" or "fusing" will occur, Fig. 8. The remedy is to stop the cause for spraying either by increasing the gate opening, by using a slower shot or by casting at a lower metal temperature. If these cannot be done the gate location should be changed. Under certain conditions, continued spraying and fusing will attack the die surface to such an extent as to make it necessary to refinish the die.

Perhaps equally as serious a source of die casting trouble is the gate-hole, Fig. 5. This defect, due to porosity at the gate opening, can sometimes be substantially reduced by increasing the pressure on the metal in the cavity just as suggested for reducing the tendency to chill. Of several castings with gate-holes which were examined it was found that the runners were very porous. It is believed that excessive turbulence in the runner could be a contributing cause of this porosity.

Sharp bends should be blended out and the cross-sectional area of the runner, from the sprue-cutter to the gate opening, should not increase at any point. Preferably it should gradually decrease throughout its length. Turbulence could also be reduced by designing the shot mechanism in such a way as to provide for relatively slow movement of the metal through the extension nozzle, sprue and runners; fast movement at end of shot when cavity is being filled.

Cold-laps will occur when two bodies of metal meet after having cooled to such a degree that it is not possible to make them mix intimately, Fig. 6. In this case the defect is usually accompanied by "chills." If the "cold-lap" persists after the gates and runners have been opened up it may be necessary to change the location of the gate opening so that the metal will be caused to flow through the affected area.

In cases where the defect occurs close

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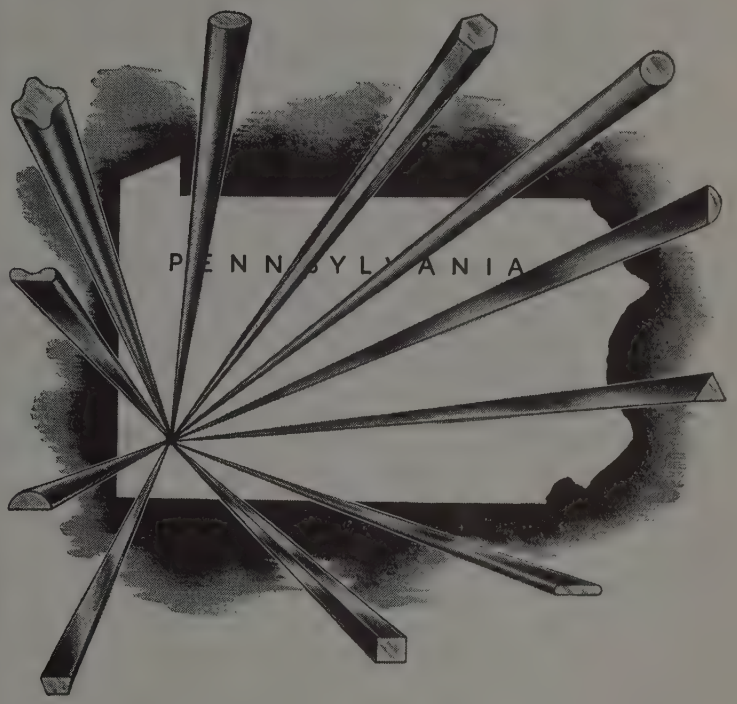

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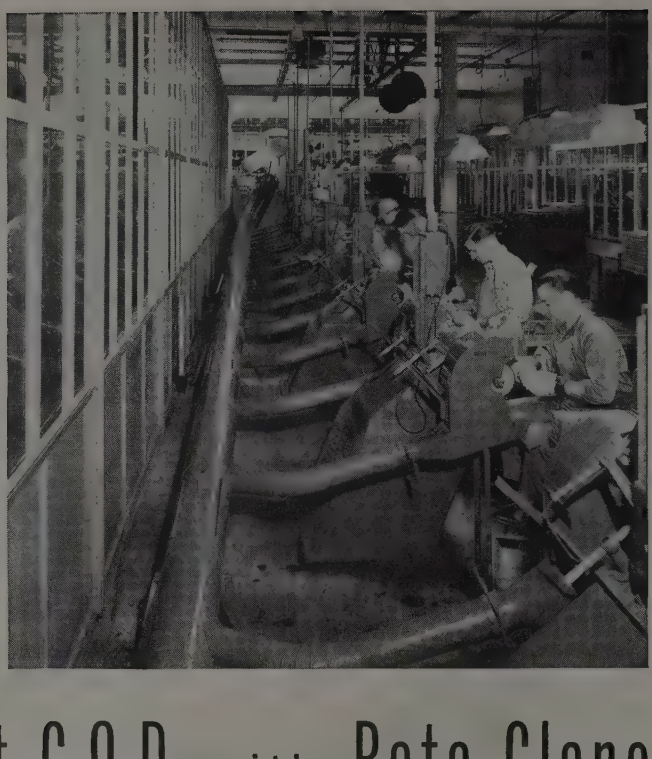

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to the parting line an improvement in the condition may be obtained by means of an overflow placed so as to change or increase the flow of metal in the area as well as to locally apply additional heat to the die surface.

Die must be sufficiently vented and the vent must be placed so that it leads from the section of the cavity which is last to fill. This position can be determined with fair accuracy by making a regular speed shot with an amount of metal which is somewhat less than that required to fill the cavity completely. The swirl, Fig. 7, being essentially a cold-lap is corrected in a similar manner.

A great many of the surface defects to which die castings are subject stem from the same fundamental cause; that is, lack of enough pressure on the metal to force it solidly against the cavity wall. The difficulty is in appreciating how many factors affect this pressure. Once the die caster realizes these, he can attack his problems in a more logical manner. He must realize that the pressure must be applied while the metal is reasonably fluid otherwise it will not assume the contours of the cavity surface.

He must realize that there can be many pressure losses between the gage on the hydraulic system and the far end of the casting. If these losses can be reduced to a minimum the die caster will often find that he can make good castings even at a lower "apparent" pressure as indicated by the gage on the accumulator bottle. A great deal of ingenuity is necessary at times to locate the cause of pressure loss. The die is one part of the equipment which can be expected to remain in the same condition for a reasonable length of time and, once corrected, can be excluded from the list of possible trouble sources.

Many other factors of die design could be mentioned which have an influence on the surface quality of the castings. However, the die designer has been successful enough in designing rigid dies and locating enough water lines (which may or may not be used, at the discretion of the die caster) so that casting of poor surface quality due to these causes are now relatively few.

Alloy Composition: In discussing die design as the most important factor to be considered when correcting surface imperfections in die castings, it is assumed that the alloy is held within specification. That the metal quality can have an important influence on surface defects is attested to by the fact that it is often necessary to hold the alloy within limits that are more narrow than the tolerances allowed in the specification in order to efficiently and consistently turn out good castings.

Most well-designed dies will produce satisfactory castings consistently even

though the composition of the alloy may vary to the extremes of the specification limits. But too often, either because of the shape of the cavity or the arrangement and design of the gates, runners and overflows, dies are extremely critical and will produce good castings only when the mechanical functioning of the machines is in perfect order and the alloy is constantly held at the composition of best castability. This places a burden of extra close control on the machine, the casting technique, and on the materials and process of alloying the metal. Judging from experience with the type 5 alloy, the composition for best castability must be maintained within the following limits:

Element	Per Cent
Aluminum	3.9 to 4.3
Copper &	1.0 to 1.25
Magnesium	0.03 to 0.04
Lead Cadmium Tin	less than 0.003
Iron	less than 0.05

Sufficient metal control to guarantee such a small degree of variation would be expensive in equipment and time, but the alloying department can aim for such composition and will, with average control, be able to maintain it a good percentage of the time.

When the alloy is of this composition, the solidification curve will show that there are no crystals freezing out above 740° F. In other words, the alloy will remain completely molten at least down to this temperaure. Shape of the curve is affected by the aluminum content and to a lesser degree by the contaminating elements in solution. When the contaminating elements are not soluble in the melt to begin with, they will not affect the solidification curve but will influence the rate at which the molten metal will flow through an orifice.

Limit of responsibility of the alloying department foreman in maintaining quality metal can only be defined by defining the quality of metal he is expected to produce and this can only be done by standardized tests. Therefore, the tests which he has available dictate the only criterion to which he can work. Present SAE and ASTM specifications for zinc alloys should be accepted as defining a quality alloy and the die caster should acknowledge that when the alloying department must work to closer tolerances it is in most cases, helping him to get along with inferior dies, machines or casting techniques. Listed below are the major elements which, when outside of the limits of the specification, are most liable to be a source of casting difficulty:

(1) Aluminum: All of the generally used zinc base die casting alloys contain about 4 per cent of aluminum. Besides contributing to the physical properties of the alloy and protecting it against

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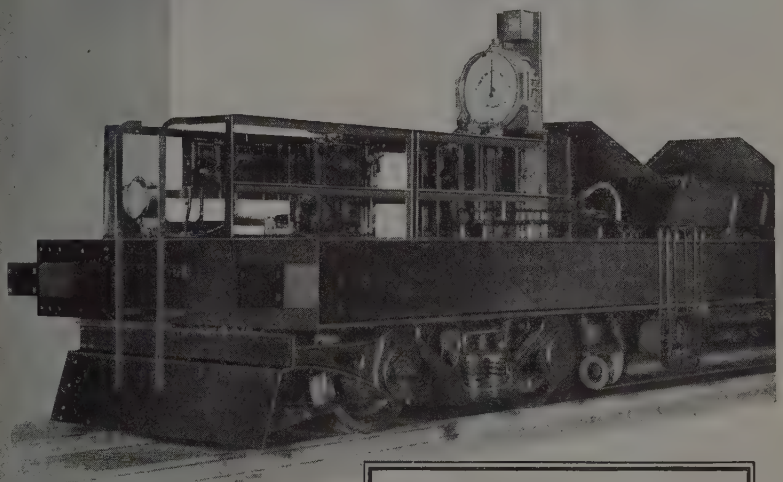

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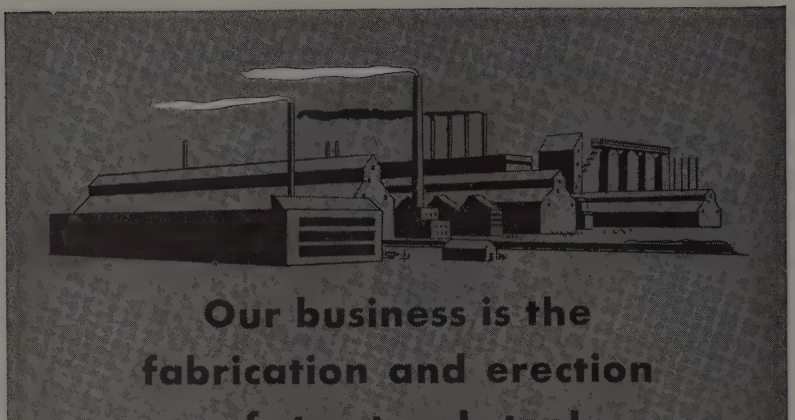

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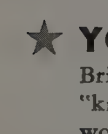

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undue iron pickup, the aluminum in the alloy is probably the most important single element contributing to castability. As the aluminum content drops below 4 per cent there will be increasing difficulty in casting parts free of chills, cold-laps and swirls. This is hardly noticeable at quantities slightly below 4 per cent but becomes quite prominent at 3.5 per cent and lower. At 3 per cent there will be difficulty with sink-spots in castings which have large differences in cross-section. Addition of copper does not help.

The lower the aluminum is below the eutectic (about 5 per cent), the higher will be the temperature at which solidification of the alloy begins. This higher freezing temperature cannot be efficiently compensated for by higher casting and die temperatures because of the limitations on die tolerances and the increase in shrinkage. Such a remedy would cause excessive flashing of the die and sink-spots as mentioned above.

Higher aluminum than 4.5 per cent begins to contribute to brittleness of the cold casting and hot-shortness causing castings to break off in the die. This tendency reaches a maximum at about 5 per cent aluminum.

Aluminum not only serves to protect the alloy against iron-pickup, but it also helps rid the alloy of iron by floating off iron in the melt as an iron-aluminum compound which can be skimmed off. Thus, aluminum is lost to some extent in remelting. In regular operation it will be found necessary to add extra aluminum to the remelt pots. The quantity of addition is difficult to standardize because the quantity lost depends on the amount of iron pickup and condition of scrap remelted.

(2) Copper: This element varies from 0 to 3.5 per cent in standard casting alloys. It contributes to corrosion resistance but at the same time makes the alloy less stable, both as to dimensions and mechanical properties. It promotes somewhat better castability by making the alloy less subject to sink-spots. Some copper is usually essential for castings which have appreciable differences in cross-section.

(3) Magnesium: Though magnesium is added to the alloy only in small quantities, primarily to protect it against the intergranular corrosion caused by lead, tin and cadmium, it also has a pronounced effect on the casting properties. It makes the alloy somewhat more sluggish to flow but though this would seem a drawback, in many ways it is beneficial to castability.

Being less fluid, the molten alloy is less liable to spraying and splashing in the die cavity. Increasing the magnesium to about 0.04 per cent will often clear up "splashes." With high mag-

nesium, the die surface becomes quickly coated with a heat insulating film, which reduces the tendency of the casting to chill.

Since spraying is reduced by addition of magnesium, it will be found that there will also be less trouble with "soldering" if the magnesium content is maintained within proper limits. As magnesium is increased above 0.05 per cent, there will be a greater tendency for the castings to show cold laps and swirls. Above 0.08 per cent the alloy is hot short.

(4) Iron: High iron can be a contributing cause of practically any of the casting difficulties and surface defects known to the die caster. Special care should always be taken to keep the iron content as low as possible. Aluminum content, if kept within specification, will do much in this direction but further reduction can only be obtained by blending with a higher purity alloy.

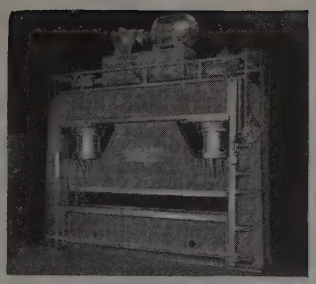
(5) Lead, Cadmium and Tin: There is some evidence that lead, cadmium and tin when close to the maximum limits allowed by the specifications will cause surface defects on castings made in critical dies. Certain brands of zinc consistently run well below 0.002 per cent lead with no cadmium or tin. When these brands of zinc are used there are fewer castings rejected for poor surface, all other conditions being equal.

Other brands containing higher lead and some cadmium invariably cause a lowered efficiency in casting. When castings of high quality surface are required, it will be found beneficial to hold these elements to a low limit. When lead, cadmium and tin appreciably exceed the maximum quantities allowed in the alloy (0.007 per cent lead, 0.005 per cent cadmium, 0.005 per cent tin, total 0.01 per cent maximum). It will be found that the metal is hot-short and brittle. Sections will break off in the die and the castings will often fall off the gates.

High purity raw materials are always used in making up these zinc base die casting alloys. Contamination being generally due to foundry pickup emphasizes the need for good housekeeping practice in the alloying department.

—o—

Principles and applications of radio frequency heating in industry are explained in a new 40-min 16 mm sound motion picture available from Westinghouse Electric Corp., 511 Wood street, Pittsburgh. The theory of induction heating is explained through animation in its first part, along with a series of practical sequences which illustrate its use. The second part explains the theory of dielectric heating and follows with a series of industrial application stories.



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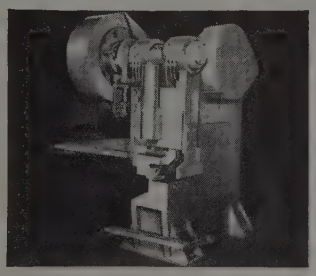

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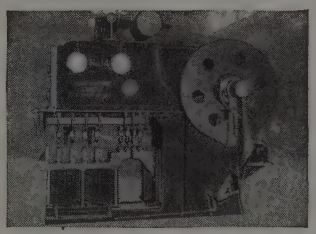

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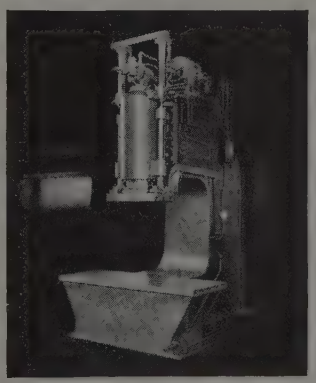

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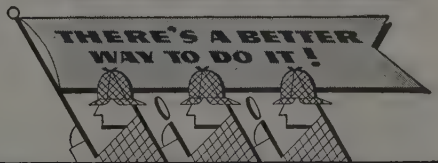

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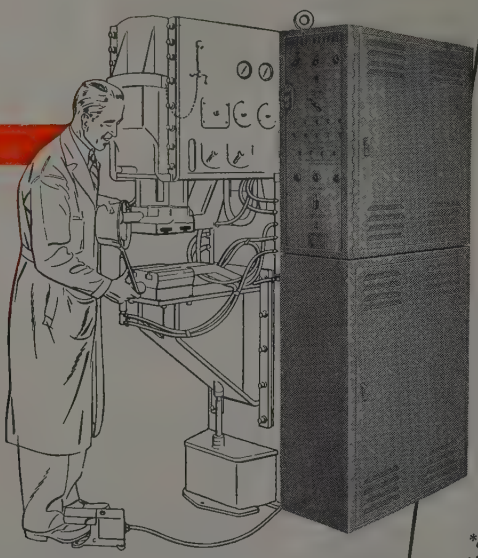

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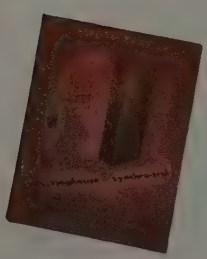

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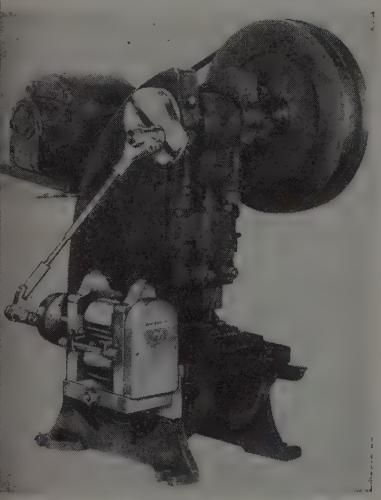
Electronics at Work

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 148

1. Press Roll Feed

Designed for both old and new type punch presses made by Benchmaster Mfg. Co., 2952 West Pico Blvd., Los Angeles 6, Calif., a new automatic friction roll feed will also fit a majority of

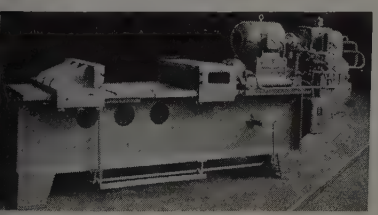


standard punch presses. It may be used with metal, wood, plastic and other materials.

Its friction drive is geared down to give 0 to 3 in. adjustment in feed. Stock up to 3 in. wide may be handled and adjustment for different thicknesses of stock, from 0 to 3/16-in. in thousandths, is taken up by a spring-loaded housing. Full speed operation is 285 strokes per minute. Height adjustment is 0 to 2¼-in. Rollers may be easily reversed from forward to backward in a few seconds.

2. Hydraulic Bulldozers

Offered in a wide range of types and sizes for both standard and special applications, hydraulic "bulldozers" made by Lake Erie Engineering Corp., Buffalo



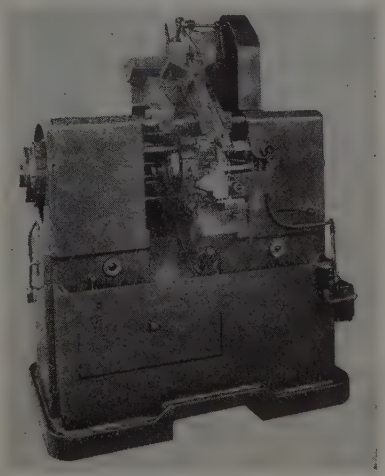
17, N. Y., are compact self contained units which are foot treadle operated. Pressure on treadle advances the crosshead. Stroke may be stopped and returned at any point by releasing the treadle.

Auxiliary and double acting traverse cylinders give rapid approach and return of the crosshead. Any part of stroke may be used with full pressure at any point. The hydraulic system eliminates danger of breakage through overloading.

Frames are constructed of heavy welded sections. Deflection under full load is negligible and close die alignment is assured at all times. Ways are hardened steel. Illustrated is a 50-ton model.

3. Double End Driller

Fully automatic, a double end driller, the Buhrmatic, is announced for production drilling of crossed holes by Buhr Machine Tool Co., 848 Green St., Ann Arbor, Mich. Machine is hopper fed,



drills, reams, countersinks and checks at desired angles by indexing the collets in an indexing turret, thus providing eight work stations and a loading and unloading station.

Batteries of four machines may be operated by one operator as parts are loaded in one bulk handling and ejected automatically. Safety devices are incorporated to stop the machine in order to prevent damage from broken tools.

4. Contour Turning Machine

In addition to the regular jobs of straight boring and turning, facing and chamfering, compound action obtained from contours on two cams directs the single point tool of the contour boring and turning machine made by New Britain Machine Co., New Britain, Conn., in producing lands, steps, recesses, flanges, counterbores and radii. This tool is fed free to the bottom of the bore and cuts on the drawback stroke.

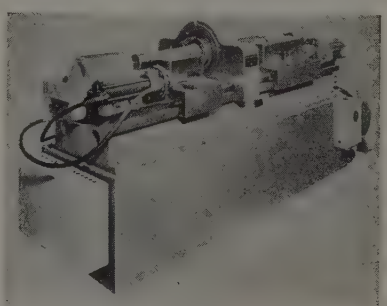
For jobs too complicated for a single point tool, a tool cluster may be arranged. Either work or tool may be held in the spindle to adapt it to a large variety of

work. Machine is so accurate that only one dimension of its work need be inspected. If cams are correct, variations on other dimensions cut by same tool are impossible.

Machine is cam and air actuated and fully equipped with safety devices. Two different size models are made and spindle speeds up to 6000 rpm are available.

5. Shaft Automatic

Completely automatic in operation, a new Benjamin shaft automatic, announced by Stanford-Roberts Mfg. Co., Dover, O., can machine both ends of a shaft at



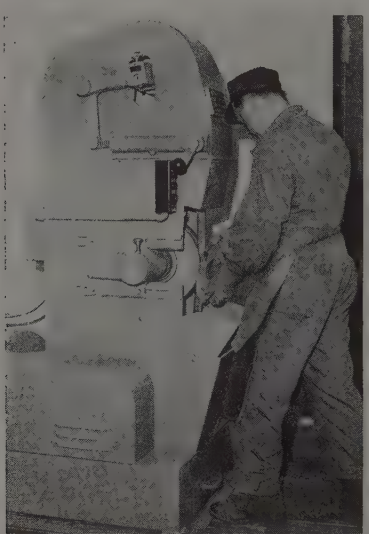
the same time, reducing costs by eliminating handling. Tooling is an all carbide setup with maximum speeds and feeds and automatic chucking of center drive type.

Infinitely variable feed is hydraulic. Shaft has three point support—a heavy

duty live center at each end and automatic center drive at core diameter. All diameters, bevels and undercuts may be handled at one time. Capacity is 1/2 to 4 3/4-in. diameters, 60 in. long with 7-in. dead center space.

6. Contour Belt Grinder

Grinding and polishing of contours and maintaining sharp, fully machined pattern is possible with the C-6 abrasive



belt grinder, made by Porter-Cable Machine Co., Syracuse, N. Y., in which a flexed belt approaches and leaves a formed contact roll at a slight angle. The belt "drapes" itself into the pattern on the roll and grinds-polishes that pattern sharply.

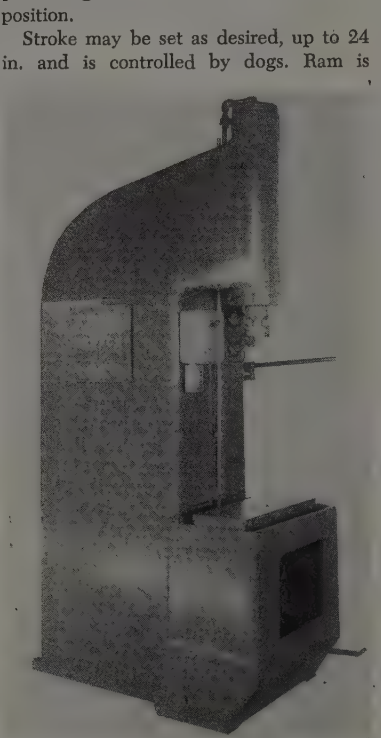
Contact roll, into which the pattern is turned, is made of sisal and latex. It holds a pattern indefinitely, yet is slightly resilient. Machine requires a space 26 x 38 in. and uses a 148 in. belt. The contact roll is not a driving force but an idler.

7. Hydraulic Press

A deep column permitting mounting of the motor inside the column, providing a cross section of sufficient rigidity to eliminate deflection for all practical purposes is a feature of the 6-ton hydraulic press announced by Acme Broach Corp., East 3rd St. at Delaware, Lexington, Ky. Machine is capable of performing any type of work that comes within its capacity.

Standard work table (illustrated) is bolted to extended foot of column as well as the vertical face, making it suitable for push broaching and assembly work. When table is removed it allows an open space between top of finished foot and end of ram of 50 in. In this condition it is possible to mount any type of special table, including those of type used in straightening. Machine may be controlled by hand or foot lever, release of either permitting ram to return to the "up" position.

Stroke may be set as desired, up to 24 in. and is controlled by dogs. Ram is



of conventional hardened and ground type, the work end being tapped 2 in.-8P with a ground bore ahead of the thread in order to centralize any adaptor or receptacle screwed into the ram. Machine is operated by a 5 hp, 1200 rpm motor. Throat depth from center of ram to frame is 9 in.

8. Hydraulic Machine

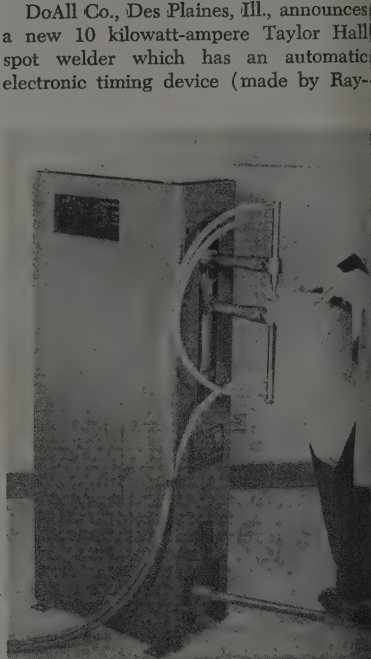
Beatty Machine & Mfg. Co., Hammond, Ind., announces a 400-ton welded steel horizontal hydraulic bulldozer, designed for structural shops, car shops and general heavy metal working industry applications. Featuring high

operating speed in relation to size, the hydraulic machine does not require that dies be shimmed or adjusted minutely to prevent machine damage. Machine has a stroke of 24 in., a maximum opening of 60 in., die space or closed opening of 24 in., 20 x 60 in. ram and resistance lug.

Operating speeds are: Advance, 0 to 144 ipm; press, 0 to 18 ipm; and return, 0 to 190 ipm. Speed is variable, controlled by amount of movement of hand lever or foot pedal. Stroke adjusting rod collars allow machine to be set for predetermined ram travel. An extra keyway is provided in the table for shifting lug to change die space of maximum opening and closed opening to 48 and 12 in., respectively, from 60 and 24 in.

9. Spot Welder

DoAll Co., Des Plaines, Ill., announces a new 10 kilowatt-ampere Taylor Hall spot welder which has an automatic electronic timing device (made by Ray-



theon) and a built-in magnetic contactor to provide perfect welds on a production basis. Made by Federal Machine & Welder Co., the welder features vertical-plane action which gives true pressure and makes tip alignment a rather simple matter.

Unit has a high power factor water cooled transformer, completely adjustable horns, water cooled electrode holders, adjustable stroke and treadle mechanism and a six-tap voltage selector. Standard machine is ready to operate after connecting to 220 volt, 60 cycle power 110 volt 60 cycle timer sources, and electrode holders and transformer to water source and drain.

10. Tracing Cleaner

Smudges, fingerprints and dust on drawings, blueprints, maps and charts may be removed with the Draw-Kleen dry cleaner introduced by Craftint Mfg. Co., Cleveland. Simple to use, it is sprinkled on and then rubbed over the surface with the palm of the hand. It has the appearance of fine, soft crumbles

vhich readily absorb dirt and will not tick to the paper. Another use is to ray down or obliterate penciling.

11. Welding Template

No. 34 welding template, developed by Rapidesign Inc., P.O. Box 592, Glendale, Calif., is for use in the drawing of standard arc, gas and resistance welding symbols as shown in American standards manual. Made of 0.040-in. plastic, its standard symbols and notes are laminated between the template sheets and cannot wear off. Size is 2¾ x 6¾-in. with rounded corners.

12. Fork Truck

Transit of material over uneven ground, on rough and slippery docks and over rail crossings is made possible with maximum traction and driver comfort by the Yardlift-20, a pneumatic-tired gas-powered fork truck of 2000-pound capa-

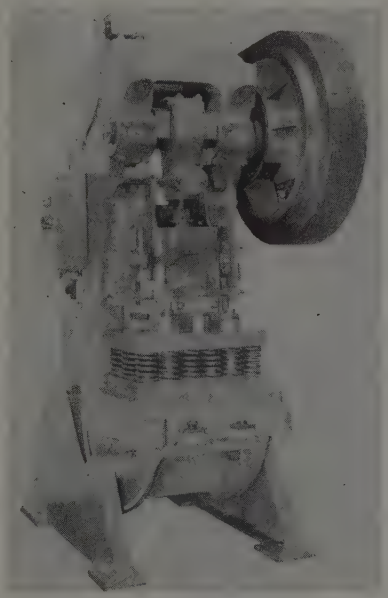
city made by Clark Tructractor Division of Clark Equipment Co., 258 West Champion street, Battle Creek, Mich. Standard models have tiering heights of 72 and 118 inches, while optional uprights provide for heights from 60 to 144 inches.

Frame is suspended at center of steering axle, permitting vehicle to conform to uneven surfaces, assuring traction at all times and preventing frame distortion and spring breakage. Seat with adjustable back rest provides driver comfort. Truck has outside turning radius of 69 inches.

13. Press Clutch and Brake

With drum type air friction clutch and brake of considerably fewer parts and much less weight, the 9 I inclinable press, made by Cleveland Punch & Shear Works Co., Cleveland 14, O., may be started and stopped quicker and with a saving in horsepower required to operate clutch. When air is applied to cylinders clutch engages flywheel and when air is released, the brake takes effect on the main shaft.

In the event of failure of electric current or air supply, brake will bring machine to an immediate stop. Clutch,



which may be applied to any size (new or old) press, either flywheel or back geared, is self adjusting and may be serviced without removal from the press. Clutch and brake are combined in a unit of one piece construction. Clutch can be set to slip under an overload.

14. Gas Purifier

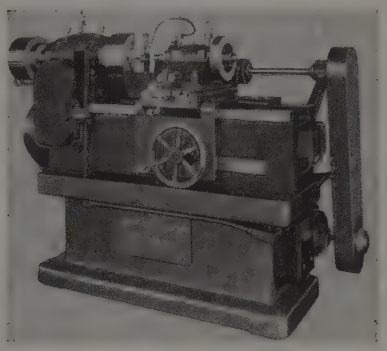
An automatic device which removes oxygen impurities and eliminates moisture from gases has been developed by Baker & Co., Newark 5, N. J. Called the Deoxo Puridryer, it may be installed at any convenient point on the low pressure line, purifying such gases as hydrogen so that less than one part in a million of oxygen impurities remain. It then dries to dew points of better than minus 50° F.

15. Threading Machine

James Coulter Machine Co., Bridgeport 5, Conn., announces the adaptation of its type HT and HS hob thread milling machines for thread milling operation in straight and taper threading dies. A large range of speeds and feeds is possible because work spindle and cutter spindle are driven by separate motors. With this drive method, the variation in speeds and feeds required for both carbon and high speed steel is obtainable.

An infinite range of speeds from 100 to 650 rpm is possible on the cutter spindle, maintaining the proper cutter speed when using small diameter milling cutters used in milling small diameter dies. Machine cycles from 26 to 155 sec are possible with standard change gears for work spindle drive. With use of the relieving attachment, dies with any number of cutting edges may be produced in one revolution of the work.

Machine has sufficient capacity for thread milling pipe dies from 3/8 to 2 in. pipe size. Round, square or any other



shape dies may be held for thread milling operation either by an air operated work holding fixture or by other types of fixtures.

16. Buffing, Polishing Wheels

Longer life is claimed for the 20-ply full disk, high count buffing wheels introduced by Universal Wheel & Abrasive Corp., 400 North Ashland avenue, Chicago 22. Wheels are offered 20, 12 and 10 sheets (ply), 4 to 16 in. diameters, in three types: Color buff, fast cutting buff and flannel buff. Wheels are made by stitching sheets together to customer's specifications.

17. Glue Heater

Quick heat, automatically held at 150 to 160° F by a thermostat, is provided by the portable electric glue heater developed by Hanson-Van Winkle-Munning Co., Matawan, N. J. Insulated to prevent heat loss, it has a removable pot of copper, nickel plated for corrosion and wear resistance. Capacity is 2 qt. It is designed for 115 v ac. Special heater units for 230 v ac are also available.

18. Power Transformers

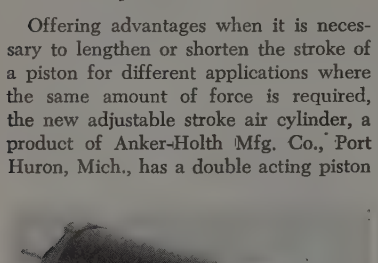
Power and lighting transformers in sizes from 1 to 100 kilovolt-amperes comprise a line announced by Transformer Division of Lindberg Engineering Co., 2444 West Hubbard street, Chicago 12. The transformers rated from 1 to 15 kva are totally enclosed for outdoor and indoor use.

Transformers of standard rating are made to operate at rated frequency and on any of the rated voltages up to 600.

All units have a wiring compartment which is manufactured with knockouts to facilitate any conduit arrangement.

19. Air Cylinder

Offering advantages when it is necessary to lengthen or shorten the stroke of a piston for different applications where the same amount of force is required, the new adjustable stroke air cylinder, a product of Anker-Holth Mfg. Co., Port Huron, Mich., has a double acting piston



for operating piston rod. It is provided with a stop piston for setting required stroke by turning hand wheel shown at right end of cylinder.

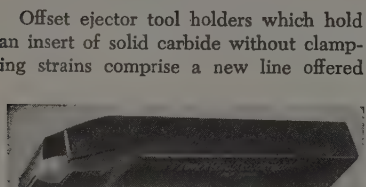
Pipe inlet ports are provided in rod end cover and in outside end of hollow center adjusting shaft for operating double acting piston. A flexible hose connection must be used to permit lateral movement of the adjusting shaft. Stop piston has packing to prevent leakage of air. Various bores and strokes may be made with the adjustable stroke control feature to suit individual requirements, on either air or hydraulic cylinders.

20. Fire Hose

Cotton rubber-lined municipal fire hose is being offered by B. F. Goodrich Co., Akron, O., with a new type aluminum alloy coupling, effecting a considerable saving in weight. Known as type 85, couplings are equipped with Koroseal swivel washers.

21. Offset Tool Holder

Offset ejector tool holders which hold an insert of solid carbide without clamping strains comprise a new line offered



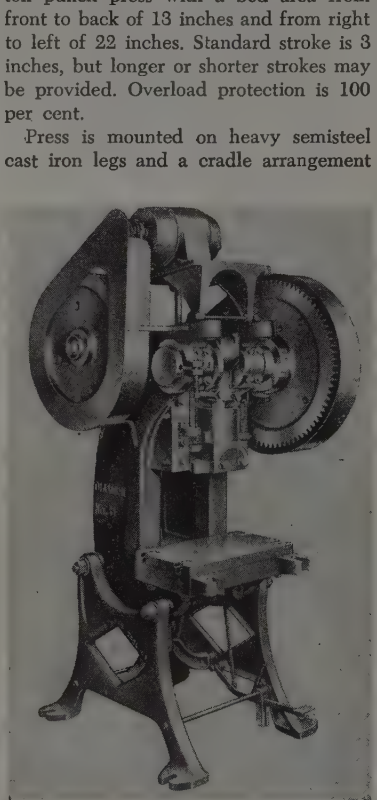
by Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich. With this new line of tools it is possible to do the hard-to-reach facing and boring operations.

Chips made by the tools have a freedom from interference with the clamping mechanism. Due to the compound angles at which this solid carbide insert is held in the holder, the maximum economy in regrinds is achieved without the wheel ever coming in contact with the steel holder.

22. Punch Press

Diamond Machine Tool Co., Los Angeles, announces a new back-geared 31-ton punch press with a bed area from front to back of 13 inches and from right to left of 22 inches. Standard stroke is 3 inches, but longer or shorter strokes may be provided. Overload protection is 100 per cent.

Press is mounted on heavy semisteel cast iron legs and a cradle arrangement



permits operation at any desired degree of inclination. Gibs, sliding surfaces and crank shaft are microfinished to provide smooth operation and long wearing life. All stock parts are interchangeable, requiring no special fitting in case replacement is necessary.

23. Blowers

Lightweight Hi-Flo blowers, designed for constant pressure output over a broad capacity range, are announced by Industrial Division of Bryant Heater Co., 1020 London road, Cleveland 10. The direct connected centrifugal machines have aluminum housings, bases and side plates and a lightweight steel impeller for quiet operation and low bearing load.

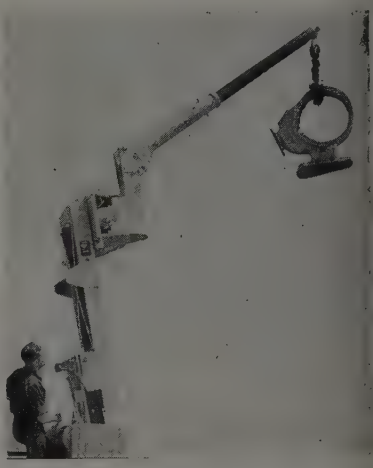
Any one of seven outlet positions may be chosen in a simple system requiring only a wrench for adjustment. Supplied for clockwise rotation, the entire unit may be reversed without special tools. A specially designed hub arrangement permits use of standard 3450 rpm motors with regular shaft extension.

Blowers range from 2 to 6 in. in outlet pipe size, supplying 100 to 525 cfm in the 4 oz pressure classification and 2 and 3 in. outlet sizes furnishing 125 cfm at 18 oz and 274 cfm at 16 oz respectively. Powering motors range from 1/3 to 2 hp, with requirements in direct proportion to actual amount of air used.

24. Fork Truck Slewing Boom

Performing crane-type operations, an interchangeable motorized slewing boom attachment was developed recently by Automatic Transportation Co., 149 West 87th street, Chicago 20, for its fork trucks. The unit has a capacity up to 1820 pounds, a maximum height of 18 feet 5 inches, and a horizontal arc of 120 degrees.

Quickly detachable, the boom may be replaced by forks or other attachments. Only one additional motor is required to enable it to perform all operations. Ver-



tical lifting is achieved through the truck's carriage lift while forward and reverse movement is effected by tilt mechanism as well as movement of truck.

Boom has manual outread adjustment from 54¼ to 108¼-inches, and is vertically adjustable from horizontal to 30 degrees upward, besides swinging 60 degrees to either side. Boom itself is operated by a single reduction slow speed worm gear unit, controlled by pushbuttons within operator's reach.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Strike Loss Accentuates Critical Steel Shortages

Progress toward supply-demand balance set back by daily loss of 16,000 tons of finished steel at Pittsburgh due to strike of steel plant railroad workers. Early curtailment of metalworking operations threatened. Stable steel prices seen over remainder of year. Scrap market quiet

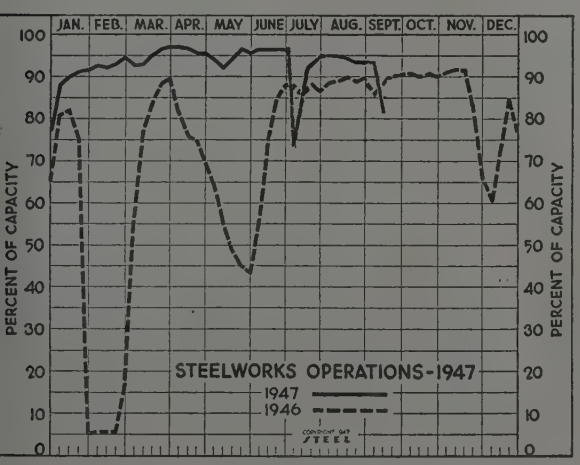
CRITICAL steel shortages, which have been preventing full-scale metalworking operations for months past, were further accentuated last week by the daily loss of 16,000 tons of finished steel occasioned by production curtailment in the Pittsburgh district forced by the wildcat strike of workers on a railroad serving Carnegie-Illinois Steel Corp. plants in that area.

While only Carnegie-Illinois Steel Corp. was affected last week, several other steelmakers depending upon Carnegie for a portion of their semifinished steel supplies will be compelled to curtail operations this week if the strike continues. Even more serious is threatened early curtailment of metalworking activity at plants dependent on finished steel from Pittsburgh since manufacturers' stocks are insufficient to bridge more than a brief interruption in shipments from the mills.

Sharp loss of Pittsburgh production is especially regrettable in view of the substantial progress toward supply-demand balance reported underway in some products though overall demand continues heavily in excess of output, especially in the flat-rolled products.

August ingot production totaled 6,989,297 net tons, gain of 400,000 tons over July. In the first eight months output amounted to 55,843,104 net tons, almost 15 million more than in the like period of 1946, and 3,044,390 more than in all of prewar 1939. Steelmakers say if the operating rate achieved so far this year holds through the remainder of the year, 1947 output will approximate 85 million tons, record-breaking for peacetime, being exceeded only during the three war years, 1942-43-44.

The steel industry is pushing to completion a $1 billion postwar plant expansion and modernization program. In addition to 3 million tons of sheet and strip capacity (most critical of short supply items), and 2,500,000 tons of ingot capacity scheduled for completion by the end of next year, 3 million tons additional blast furnace capacity and 3 million tons additional coke oven facilities are scheduled for completion by that time. Materials and equipment shortages, as well as labor difficulties, have prevented completion of many projects on schedule. In addition, strikes have caused a loss of 18 million tons of steel production since end of the war, and currently the industry is unable to attain maximum use of existing productive facilities because of the short supply and poor quality of scrap.



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Sept. 13	Change	Same Week 1946	Same Week 1945
Pittsburgh	47	—51.5	97.5	73.5
Chicago	93.5	+ 3	90	83.5
Eastern Pa.	92	None	80	75
Youngstown	92	None	89	85
Wheeling	93.5	+12	93.5	95
Cleveland	91	None	88	83
Buffalo	88.5	— 5.5	90.5	81.5
Birmingham	99	None	99	95
New England	80	None	86	78
Cincinnati	94	+ 7	83	76
St. Louis	82	None	51.5	68
Detroit	91	— 1	86	89
Estimated national rate	82	—11	89.5	80.5

Based on weekly steelmaking capacity of 1,749,928 net tons for 1947; 1,762,381 net tons for 1946; 1,831,636 tons for 1945.

Pressure for steel shipments continues without parallel in peacetime. Mill books will carry into fourth quarter substantial tonnage scheduled for third quarter. Producers have cut back consumers' fourth quarter allotments to take up this overflow and still further cuts may be necessary to make up for the loss of production this past week.

Prices held steady last week, and except for an upward revision on tin plate late this year no major adjustments are in prospect for remainder of 1947. Scrap has quieted down, holding at the lower levels recently established. Scrap is moving in better volume on old contracts but the stringency in pig iron appears as severe as ever.

Steelmaking operations dropped 11 points last week, the national ingot rate falling to 82 per cent of capacity, lowest since week of July 5 when the rate averaged 73 per cent. Curtailed operations in the Pittsburgh district because of the steel plant railroad strike were the primary factor for the current slump, that district's rate falling 51½ points to 47 per cent of capacity. Also lower were operations at Buffalo, off 5½ points to 88.5 per cent, and in Detroit where the rate of 91 per cent was 1 point lower. Gains were recorded at Chicago, up 3 points to 93.5 per cent; Wheeling, 12 points to 93.5 per cent; and Cincinnati, 7 points to 94 per cent.

STEEL's finished steel composite remained steady at $75.41 last week, as did semifinished steel at $56.80 and steelmaking scrap at $37.83. The steelmaking pig iron composite dropped slightly to $36.09.

COMPOSITE MARKET AVERAGES

	Sept. 13	Sept. 6	Aug. 30	One Month Ago Aug., 1947	Three Months Ago June, 1947	One Year Ago Sept., 1946	Five Years Ago Sept., 1942
Finished Steel	$75.41	$75.41	$75.41	$75.41	$69.82	$64.45	$56.73
Semifinished Steel	56.80	56.80	56.80	56.80	52.10	40.60	36.00
Steelmaking Pig Iron	36.09	36.20	36.28	36.06	32.49	27.50	23.00
Steelmaking Scrap	37.83	37.83	37.83	39.00	32.48	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Materials

	Sept. 13, 1947	Aug, 1947	June, 1947	Sept., 1946
Steel bars, Pittsburgh	2.90c	2.90c	2.60c	2.50c
Steel bars, Philadelphia	3.28	3.28	2.98	2.86
Steel bars, Chicago	2.90	2.90	2.50	2.50
Shapes, Pittsburgh	2.80	2.80	2.50	2.35
Shapes, Philadelphia	2.94	2.94	2.64	2.48
Shapes, Chicago	2.80	2.80	2.50	2.35
Plates, Pittsburgh	2.95	2.95	2.65	2.50
Plates, Philadelphia	3.15	3.15	2.85	2.558
Plates, Chicago	2.95	2.95	2.65	2.50
Sheets, hot-rolled, Pittsburgh	2.80	2.80	2.50	2.425
Sheets, cold-rolled, Pittsburgh	3.55	3.55	3.20	3.275
Sheets, No. 10 galv., Pittsburgh	3.90	3.90	3.55	†4.05
Sheets, hot-rolled, Gary	2.80	2.80	2.50	2.425
Sheets, cold-rolled, Gary	3.55	3.55	3.20	3.275
Sheets, No. 10 galv., Gary	3.90	3.90	3.55	†4.05
Strip, hot-rolled, Pittsburgh	2.80	2.80	2.50	2.45
Strip, cold-rolled, Pittsburgh	3.55	3.55	3.20	3.05
Bright basic, bess. wire, Pittsburgh	3.675	3.675	3.425	3.05
Wire nails, Pittsburgh	4.25	4.25	4.125	3.75
Tin plate, per base box, Pittsburgh	$5.75	$5.75	$5.75	*$5.25

* Nominal. † Base, No. 24 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$50.00	$38.00
Slabs, Pittsburgh, Chicago	47.50	47.50	42.00	39.00
Rerolling billets, Pittsburgh	47.50	47.50	42.00	39.00
Wire rod ⅜ to ¼-inch, Pitts.	2.925c	2.925c	2.55c	‡2.30c

‡ Base, No. 5 to ⅜-in.

Pig Iron

	Sept. 13, 1947	Aug, 1947	June, 1947	Sept., 1946
Bessemer, del. Pittsburgh	$37.83	$37.83	$34.83	$29.77
Basic, Valley	36.00	36.00	33.00	28.00
Basic, eastern del. Philadelphia	38.72	38.72	35.52	29.93
No. 2 fdry., del. Pgh. N. & S. sides	37.33	37.33	34.33	29.27
No. 2 fdry., del. Philadelphia	39.22	39.22	36.02	30.43
No. 2 foundry, Chicago	36.00	36.00	33.00	28.50
No. 2 foundry, Valley	36.50	36.50	33.50	28.50
Southern No. 2, Birmingham	34.88	34.51	29.88	24.88
Southern No. 2, del. Cincinnati	39.75	39.38	34.75	28.94
Malleable, Valley	36.50	36.50	33.50	28.50
Malleable, Chicago	36.50	36.50	33.50	28.50
Charcoal, low phos., fob Lyles, Tenn.	44.00	44.00	40.50	33.00
Ferromanganese, fob cars, Pittsburgh	140.25	140.25	140.25	140.00

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$38.00	$39.875	$32.44	$20.00
Heavy melt. steel, No. 2, E. Pa.	36.75	38.35	33.38	18.75
Heavy melt. steel, No. 1, Chicago	38.75	39.625	30.75	18.75
Heavy melt. steel, No. 1, Valley	39.00	40.50	34.06	21.00
Heavy melt. steel, No. 1, Cleveland	38.25	38.81	32.38	19.50
Heavy melt. steel, No. 1, Buffalo	39.50	40.88	32.00	19.25
Rails for rerolling, Chicago	46.25	47.125	38.75	22.25
No. 1 cast, Chicago	43.50	43.50	39.50	23.75

Coke

Connellsville, beehive furnace	$12.00	$12.00	$9.56	$8.75
Connellsville, beehive foundry	14.50	14.50	10.75	9.50
Chicago, oven foundry, del.	18.50	18.50	16.10	15.10

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality $46, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $45-$50, sales by smaller interests on negotiated basis at $65 or higher. Detroit, del., $53; eastern Mich., $54.

Forging Quality, Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $55-$58; Detroit, del., $61; eastern Mich., $62.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66, del. Detroit $69, eastern Mich., $70.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $60; sales by smaller interests on negotiated basis at $66 or higher.

Skelp: Pittsburgh, Sparrows Point, Youngstown, Coatesville, 2.60c-2.65c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69.

Wire Rods: Pittsburgh, Chicago, Birmingham, ⅜ to ¼-in., inclusive $2.80-3.05 per 100 lb. Galveston base, $2.95. Worcester, 2.90c. San Francisco (base del.), $3.52.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, Duluth, base, 20 tons one size, 2.90c; Detroit, del., 3.05c; eastern Mich., 3.10c; New York, del., 3.31c; Phila., del., 3.28c; San Francisco (base, del), 3.63-3.95c; Los Angeles (base, del.), 3.625-3.86c; Seattle, 3.58c, base.

Rail Steel Bars: Same basing points as merchant carbon bars, except base is 10 tons. Prices upon application.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.30c; Detroit, del., 3.45c; eastern Mich., 3.50c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lb., 3.55c; Detroit, del., 3.70c; Toledo, 3.75c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 4.10c; Detroit, del., 4.25c; eastern Mich., 4.30c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.75c; San Francisco (base, del.), 3.33c; Los Angeles (base, del), 3.325c; Seattle, 3.88c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base price upon application.

Iron Bars: Single refined, Pittsburgh 7.15c-†7.70c; double refined, 8.00-†9.75c; Pittsburgh, staybolt, 8.85c-†11.25c.

† Hand puddled.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Ashland, Ky., base, 2.80c; Granite City, 3.175c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; Philadelphia, del., 3.00c; New York, del., 3.09c; Los Angeles (base, del.), 3.54c; San Francisco, (base, del.), 3.545c. (Andrews Steel Co. quotes Middletown, O., base for shipment to Detroit. Alan Wood Steel Co., Conshohocken, Pa., quotes 3.40c, Sparrows Point equivalent.

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.55c; Granite City, 3.65c; Detroit, del., 3.70c; eastern Mich., del., 3.75c; New York, del., 3.96c; Philadelphia, del., 3.93c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Canton, Middletown, base 3.85c-3.95c; Granite City, 4.05c; New York, del., 4.24c; Philadelphia, del., 4.15c; Los Angeles (base, del.), 4.62c; San Francisco (base, del.), 4.625c.

Corrugated Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham base, 3.95c-4.05c.

Culvert Sheets, No. 16 flat: (Based on 5 cent zinc), corrugated 10 cents extra; Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.45c-4.55c; copper-iron or pure iron, 4.80c-4.90c. Granite City base prices 10 points higher. Los Angeles (base, del.), 5.24c; San Francisco (base, del.) 5.245c.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: Pittsburgh, 7.50c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.85c-4.05c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.90c-3.95c; Granite City, base, 4.05c; Detroit; del., 4.10c; eastern Mich., 4.15c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, Chicago, Gary, 4.80c; Granite City, Ill., Kokomo, Ind., 4.90c. Electrical: Pittsburgh, Chicago, Gary, 5.30c; Granite City, Kokomo, 5.40c. Motor: Pittsburgh, Chicago, Gary, 6.05c; Granite City, 6.15c. Dynamo: Pittsburgh, 6.75c; Granite City, 6.85c. Transformer 72, 7.25c; 65, 7.95c; 58, 8.65c; 52, 9.45c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.80c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; San Francisco (base del.), 3.605c; Los Angeles (base del.), 3.60c.

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.55c; Chicago, base, 3.65c; Detroit, del. 3.70c; eastern Mich., 3.75c; Worcester, base, 3.75c-4.10c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 5.05c; over 0.60 to 0.80, 5.65c; over 0.80 to 1.00, 7.15c; over 1.00, 9.45c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.90c; Granite City, Birmingham, Sparrows Point, 4.00c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-lb base box $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh base per package (112 sheets; 20 x 28 in., coating I.C. 8-lb $14.10.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.95c; Coatesville, Claymont, 3.15c; Geneva, Utah, 3.10c; New York, del. 3.24c; Phila., del., 3.15c; St. Louis, del., 2.77c; Boston, del., 3.16c; San Francisco and Los Angeles, del. (sizes and grades produced at Geneva only), 3.59c.

(Central Iron & Steel Co., Harrisburg, Pa., 4.15c, basing points.)

Floor Plates: Pittsburgh, Chicago, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.80c-4.137c; Coatesville, 4.50c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.80c; New York, del., 3.00c; Phila., del., 2.94c; Geneva, Utah (base, del.), 2.975c; Los Angeles (base, del.), 3.41c-3.47c; Los Angeles and San Francisco (sizes produced at Geneva only), del., 3.44c; Kaiser, del., San Francisco, 3.41c.

(Phoenix Iron Co., Phoenixville, Pa., nominally; 4.00c, fob Phoenixville.)

Alloy Structural Shapes: Pittsburgh, Chicago, 3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer.....*$3.55-3.80
Spring (except Birmingham)....**$4.25-**4.50

Wire Products to Trade

Nails

Standard and cement-coated ..... †$4.25
Galvanized ..... ‡$4.00
Staples, polished and galvanized..... $4.25

Wire, Merchant Quality

Annealed (6 to 8 base) ..... §$4.20
Galvanized (6 to 8 base) ..... §$4.65

(Fob Pittsburgh, Chicago, Birmingham, per base column)

Woven fence, 15 gage and heavier.... ††91
Barbed wire, 80-rod spool..... ††101
Barbless wire, twisted 101
Fence posts (no clamps) ..... ††90
Bale ties, single loop..... ††91

* Worcester, $3.65, Duluth, $3.60, base. San Francisco (base, del) $4.56 for bright basic only.

** Worcester $4.60, Duluth and Trenton, N. J., $4.75, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28 black premier.

† Worcester $4.55, Cleveland $4.35, base. San Francisco (base, del.) $5.33.

‡ Duluth $4.00, Cleveland $4.10, base. San Francisco (base, del.) $5.08.

§ Worcester $4.30, annealed; $4.75, galvanized, Duluth $4.20, annealed; $4.65, galvanized. San Francisco (base, del.) $5.21, annealed; $5.66, galvanized.

†† San Francisco (base, del.): Woven fence, 114; barbed wire, 121; bale ties, 115. Duluth (base): Woven fence, 91; barbed wire, 101; fence posts 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.10 per 100 lb; light rails (rail steel), Williamsport, Pa., Pittsburgh prices upon application.

Relaying, 60 lb and over fob warehouse $55-$56 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates, $3.05 per 100 lb, fob mill; $3.40 base, Seattle; $3.20, base, Pittsburg, Calif. Splice bars, $3.25 per 100 lb, fob mill. Standard spikes, 4.00c-4.50c; screw spikes, 5.80c-6.40c. Axles, 4.10c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

	Butt Weld				
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	46	19½	1	56	41½
¼	47	25	1¼	56½	42
⅜	44	22	1½	57	42½
½	50½	34½	2	57½	43
¾	53½	38½	2½ & 3	58	43½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	49	34	48½	33½	48	33
2½-3.	52	37	51½	36½	51	36
3½-6.	54	39	53½	38½	53	38

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Butt Weld	In.	Butt Weld
⅛	45	1	55
¼	46	1¼	55½
⅜	43	1½	56
½	49½	2	56½
¾	52½	2½ & 3	57

In.	Lap Weld	Elec. Weld	Seamless
2	48	47½	47
2½ & 3	51	50½	50
3½-6	53	52½	52
8	53½	53	52½
10	53	52½	52
12	52	51½	51

Boiler Tubes: Net base prices per 100 ft, fob Pittsburgh, in carload lots, minimum wall thickness, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D.		Hot	Cold	Hot	Cold
Sizes	B.W.G.	Rolled	Drawn	Rolled	Drawn
1″	13	....	$11.87	$11.51	$11.51
1¼″	13	....	14.06	11.48	13.64
1½″	13	$13.08	15.69	12.69	15.22
1¾″	13	14.88	17.85	14.43	17.31
2″	13	16.67	19.99	16.17	19.39
2¼″	13	18.58	22.29	18.02	21.62
2¼″	12	20.47	24.54	19.86	23.80
2½″	12	22.42	26.87	21.75	26.06
2¾″	12	23.76	28.48	23.05	27.63
3″	12	24.93	29.90	24.18	29.00
3¼″	11	29.03	34.81	28.16	33.77
3½″	11	31.17	37.39	30.23	36.27
4″	10	38.69	46.38	37.53	44.99
4½″	9	51.28	61.50	....	....
5″	9	59.39	71.18	....	....
6″	7	91.13	109.27	....	....

Pipe, Cast Iron: Class B, 6-in. and over $74.50 per net ton, Birmingham; $79.50, Burlington, N. J.; $85.06, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B. Prices effective as of July 24, 1947.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length ..... 48 off
⅝ and ⅝ x 6-in. and shorter..... 50 off
Larger diameter; longer than 6 in..... 47 off

Tire bolts ..... 38 off
Step bolts ..... 46 off
Plow bolts ..... 57 off
Lag bolts
¼ in. up to 1 in., 6 in. and shorter. 50 off
¼ in. up to 1 in., longer than 6 in.. 48 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller	51 off	....
1-in. and smaller	....	50 off
1⅛-in.-1-in.	48 off	....
1⅛-in.-1-in.	....	49 off
1⅛-in.-1½-in.	46 off	47 off
1⅝-in. and larger	....	40 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in. smaller (10-20 bright).... 56 off
Upset (10-35 heat treated)
⅝ x 6 ..... 51 off
¾, ⅞, & 1 x 6 ..... 47 off

Square Head Set Screws

Upset 1-in. and smaller..... 61 off
Headless, ¼-in. and larger..... 46 off
No. 10 and smaller ..... 56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago
Birmingham

Structural 5.25c
Lebanon, Pa. 5.40c
⅞-in. and under ..... 55-5 off
Lebanon, Pa. .....55-5 off plus 15c per cwt.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00-17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, Per lb
18.00	4	1	...	82.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26.00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50	51.00	40.50	51.00
310....	53.50	56.50	57.50	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403....	23.50	27.00	32.00	23.00	29.50
410....	20.50	23.50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	36.50	26.00	39.50
430 ...	21.00	24.00	31.50	19.00	24.50
430F ..	21.50	24.50	32.00	20.50	27.00
442....	24.50	28.00	35.50	26.00	35.00
443....	24.50	28.00	35.50	26.00	35.00
446....	30.00	33.00	39.50	38.00	56.50
*501...	9.00	13.00	17.50	13.00	18.50
*502...	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304....	....	24.00	22.00	....	....
410....	....	22.00	20.00	....	....
430....	....	22.50	20.50	....	....
446....	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$37.50	$37.00	$38.50	$38.00
Newark, N. J., del.	39.34	38.84	40.34	39.84
Brooklyn, N. Y., del.	40.50	....	....	41.00
Philadelphia, del.	39.22	38.72	40.22	39.72
Birdsboro, Pa., base	40.50	40.00	41.50	41.00
Birmingham, base	33.38*	32.88*	....	....
Baltimore, del.	39.78	....	....	....
Chicago, del.	37.12	....	....	....
Cincinnati, del.	38.25	....	37.75	....
Newark, N. J., del.	39.46	....	....	....
Philadelphia, del.	38.84	....	....	....
St. Louis, del.	37.37	....	36.87	....
Buffalo, base	*36.00	*35.50	37.00	*36.50
Boston, del.	42.48	41.98	43.48	42.98
Rochester, del.	37.84	37.34	38.84	38.34
Syracuse, del.	38.50	38.00	39.50	39.00
Canton, Massillon, O., base	36.00	35.50	....	36.50
Chicago, base	36.00	35.50	37.00	36.50
Milwaukee, del.	37.32	36.82	38.32	37.83
Muskegon, Mich., del.	39.83	....	....	40.33
Cleveland, fob furnace	*36.00	*35.50	37.00	*36.50
Akron, del.	37.67	37.17	38.67	38.17
Duluth, base	36.50	36.00	37.50	37.00
Erie, Pa., base	36.00	35.50	37.00	36.50
Everett, Mass., base	45.00	....	....	45.50
Granite City, Ill., base	37.00	36.50	....	37.00
St. Louis, del.	37.75	37.25	....	37.75
†**Neville Island, Pa.,** base	36.50	36.00	37.00	36.50
Pittsburgh, del., N.&S. Sides	37.33	36.83	37.83	37.33
Provo, Utah, base	36.50	36.00	....	....
Seattle, Tacoma, Wash., del.	41.60	....	....	....
Portland, Oreg., del.	41.60	....	....	....
Sharpsville, Pa., base	36.50	36.00	37.00	36.50
Steelton, Pa., base	37.50	37.00	38.50	38.00
Struthers, O., base	37.00	36.50	37.50	37.00
Swedeland, Pa., base	41.50	41.00	42.50	42.00
Troy, N. Y., base	38.00	37.50	39.00	38.50
Toledo, O., base	36.00	35.50	37.00	36.50
Cincinnati, del.	39.50	39.00	....	....
Youngstown, O., base	36.50	36.00	37.00	36.50
Mansfield, O., del.	39.48	38.98	39.98	39.48

† To Neville Island base add: 66c for McKees Rocks, Pa., $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Oakmont, Verona; $1.49 Brackenridge.

* Republic Steel Corp. quotes $3 a ton higher at Birmingham, effective Aug. 13; $2.00 higher at Buffalo and $2.75 higher at Cleveland, effective on shipments during week ended Sept. 13.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base)	$45.50		
6.51-7.00	$46.75	9.01- 9.50	53.00
7.01-7.50	48.00	9.51-10.00	54.25
7.51-8.00	49.25	10.01-10.50	55.50
8.01-8.50	50.50	10.51-11.00	56.75
8.51-9.00	51.75	11.01-11.50	58.00

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron: Si 14.01-14.50%, $72.50, Jackson, O.; $73.75, Niagara Falls; $74, piglets, $72, open-hearth and foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn....$44.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa.....$36.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $42.00; Birdsboro, Pa., $45 base; Philadelphia, $44.22, del. Intermediate phosphorus, Central furnace, Cleveland, $39.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgcal Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$11.50-$12.50
Connellsville, foundry	14.00- 15.00
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

Oven Foundry Coke

Kearney, N. J., ovens	$17.85
Chicago, outside del.	17.50
Chicago, del.	18.50
Terre Haute, del.	18.05
Milwaukee, Ovens	18.25
New England, del.	19.50
Birmingham, del.	15.00
Indianapolis, ovens	17.00
Cincinnati, del.	16.50
Ironton, O., ovens	15.50
Painesville, ovens	16.60
Cleveland, del.	17.90
Buffalo, del.	18.25
Detroit, del.	17.65
Philadelphia, ovens	16.75
Swedeland, Pa., ovens	16.75
Portsmouth, O., ovens	16.00
Fairmont, W. Va., ovens	15.75
Pittsburgh, del.	17.61

Coal Chemicals

Spot, gal. freight allowed east of Omaha. Effective as of Apr. 1, 1947.

Pure and 90% benzol	19.00c
Toluol, two degrees	23.00c
Industrial xylol	23.00c
Solvent naphtha	26.00c

Per pound fob works

Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "house-hold use"	9.50c

Per ton, bulk, fob plants

Sulphate of ammonia	$30.00

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	75.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low Heat Duty

Pa., Md., Ohio	56.00

Ladle Brick

(Pa., O., Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Malleable Bung Brick

All bases	80.00

Silica Brick

Pennsylvania	70.00
Joliet, E. Chicago	79.00
Birmingham, Ala.	70.00

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.00
Chem. bonded chrome	59.00
Magnesite brick	81.00
Chem. bonded magnesite	70.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.	
Bulk	24.00
Single bags	28.00

Dolomite

Domestic, dead-burned, bulk, net ton, fob Billmeyer, Blue Bell or Williams, Pa., Millville, W. Va. Narlo, Millersville, Martin, Gibsonburg or Woodville, O., $10.55; Midwest (fob Thornton or McCook, Ill.), add $0.10; Missouri Valley (fob Dolly Siding, Mo.), add $0.20.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.9
Old range nonbessemer	5.8
Mesabi bessemer	5.7
Mesabi nonbessemer	5.5
High phosphorus	5.5

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	15.2

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom
Swedish basic, 60 to 68%	13.5
Spanish, No. African basic, 50 to 60%	Nom
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50–6.5

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$32–$3

Manganese Ore

46-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 63.00c-67.00c.

Chrome Ore

Gross ton fob cars, New York Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.5
48% 3:1	39.0
48% no ratio	31.0
South African (Transvaal)	
44% no ratio	$27-$27.5
45% no ratio	28.0
48% no ratio	30.0
50% no ratio	31.0
Brazilian—nominal	
44% 2.5:1 lump	$33.6
48% 3:1 lump	43.5
Rhodesian	
45% no ratio	$27-$27.5
48% no ratio	30.0
48% 3:1 lump	39.0
Domestic (seller's nearest rail)	
48% 3:1	$39.0

Molybdenum

Sulphide conc., lb., Mo. cont., Mines	$0.7

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60% $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	...	...	...
Cold-Rolled	5.30	5.30	5.30	5.30	...	5.30	...	...	...
Galvanized	5.85	...	...	...	...	...	...	...	...
Strip, Hot-Rolled	4.30	4.30	4.30	4.30	...	...	...	...	...
Cold-Rolled	5.30	5.30*	5.30*	5.30	...	...	...	...	...
Shapes Structural	4.30	4.30	...	4.30	...	...	4.30	...	...
Plates	4.55	4.55	4.55	...	4.55	...	...	...	...
Bars, Small Shapes	4.45	4.45	4.45	4.45	...	4.45	...	4.45	4.45

*Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. •10G	Gal. •24G	†H-R	†C-R	H-R Rds. ⅝" to 3"	C-F Rds. ½" & up	H-R Alloy ($4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ⅜" & Thicker
Boston (city)	4.90	5.97[4]	5.67[4]	6.10[4]	7.35[4]	4.97	6.71	4.92	5.57	7.17	4.77	5.05	6.72
†New York (city)	4.87	6.07	5.77[8]	6.07	7.32	4.97	....	4.97	5.52	6.97[9]	4.72	5.02	6.70
New York (country)	4.72	5.92	5.62[8]	5.92	7.17	4.82	....	4.82	....	....	4.57	4.87	6.55
Philadelphia (city)	4.64	6.23[9]	5.83[9]	5.84	7.09	4.73	5.63	4.78	5.48	6.92[9]	4.52	4.79	6.13
Philadelphia (country)	4.54	6.13[9]	5.73[9]	....	....	4.63	5.53	4.68	....	6.82[9]	4.42	4.69	6.03
Baltimore (city)	4.29†	5.85[8]‡	5.55[8]†	5.54	6.79	4.70	....	4.75	5.45	....	4.64	4.74	6.20
Baltimore (country)	4.19†	5.75[8]†	5.45[8]†	5.35	6.60	4.60	....	4.65	....	....	4.54	4.64	6.10
Washington (city)	4.75	....	....	....	....	4.95	....	5.00	5.60[12]	....	4.90	4.95	6.60
Washington (country)	4.65	....	....	....	....	4.85	....	4.90	....	....	4.80	4.85	6.50
Norfolk, Va.	4.75	....	....	....	....	....	....	5.05	5.85	....	5.00	5.00	6.75
Memphis, Tenn. (city)	4.82§§	....	5.88	6.37	....	5.02	....	4.97	5.98	....	4.97	5.17	6.88
Memphis, Tenn. (country)	4.72§§	....	5.78	6.27	....	4.92	....	4.87	5.88	....	4.87	5.07	6.78
Buffalo (city)	4.45	....	5.20[6]	5.90	....	4.60	5.60	4.40	5.10	8.15	4.40	4.85	6.20
Buffalo (country)	4.30	....	5.05[6]	5.75	....	4.45	5.45	4.25	4.95	8.00	4.25	4.70	6.05
Pittsburgh (city)	4.40§§	....	5.25[8]‡	5.65	6.90	4.50	5.50	4.55	5.25	7.05	4.55	4.75	6.10
Pittsburgh (country)	4.25§§	....	5.10[8]†	5.50	6.75	4.35	5.35	4.40	5.10	6.90	4.40	4.60	5.95
Cleveland (city)	4.45	5.50[8]	5.20[8]	5.638	6.888	4.488	5.35	4.40	5.10	6.908	4.611	4.55	6.111
Cleveland (country)	4.30	5.35[8]	5.05[8]	....	....	....	5.20	4.25	4.95	....	....	4.40	....
Cincinnati (city)	4.671	5.516[8]	....	5.716	6.466	4.694	....	4.703	5.353	....	4.744	4.903	6.244
Chicago (city)	4.45	5.50[8]	5.20[8]	5.65	6.90	4.35	5.35	4.40	5.10	6.65[12]	4.40	4.60	6.05
Chicago (country)	4.30	5.35[8]	5.05[8]	5.50	6.75	4.20	5.20	4.25	4.95	6.65[12]	4.25	4.45	5.90
Milwaukee	4.599	5.649[8]	5.349[8]	5.799	7.049	4.499	5.599	4.549	5.249	6.949[9]	4.549	4.749	6.199
St. Louis	4.749	5.799[9]	5.499[5]	5.974	7.224	4.649	5.774	4.699	5.424[12]	7.124	4.699	4.899	6.349
Birmingham (city)	4.45[20]§§	....	....	5.80	....	4.45[20]	....	4.40[20]	5.93[22]	....	4.40	4.65	6.86
Birmingham (country)	4.30[20]§§	....	....	5.50	....	4.30[20]	....	4.25[20]	....	....	4.25	4.50	....
New Orleans	4.98[20]••	....	6.29[18]	....	....	5.18[20]	....	5.13[20]••	6.29[11]	....	5.03[20]••	5.33[20]	7.29[20]
Omaha, Nebr.	5.068	....	....	6.468	7.718	5.168	....	5.218	5.918	....	5.218	5.418	6.868
Seattle, Tacoma, Wash.	5.30[17]	....	7.10[5]	6.70	....	5.60[17]	....	5.30[17]	7.45[10]	8.50[13]	5.25[17]	5.45	7.55[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—any quantity; [2]—300 to 1999 lb; [3]—150 to 2249 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—one bundle to 1499 lb; [7]—one to nine bundles; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [10]—450 to 39,999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [13]—400 to 14,999 lb; [14]—400 to 39,999; [16]—2000 lb and over; [16]—1000 to 4999; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999; [20]—400 to 8999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

• Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § as rolled, except Indianapolis, Los Angeles, San Francisco where price represents annealed bars; •• add 0.46 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier.

PRICES OF LEADING FERROALLOYS PRODUCTS

Spiegeleisen: 19-21% Mn, 1-3% Si, carlot per gross ton, $47, Palmerton, Pa., $51, Pittsburgh. 16% to 19% Mn., $46, Palmerton, $50, Pittsburgh.

Ferromanganese, standard: 78-82% Mn, gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. where Sloss-Sheffield Steel & Iron Co. is producer); $140.25 fob cars, Pittsburgh, including 75c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $15 for ton, $22 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 0.50c; medium, 14.50c; central one: Special, 21.30c; regular, 0.80c; medium, 14.80c; western one: Special, 21.30c; regular, 1.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon as content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 1 lb Mn). Prices per lb of briquets: Contract, bulk, carlots, 7.00c, packed, carlots, 7.60c, ton lots, 8.00c, smaller lots 8.40c, eastern, freight allowed; 7.25c, 7.85c, 8.60c and 9.00c, central; 7.80c, 8.40c, 8.50c and 10.90c, western; spot up 1.25c; notched, up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $2.32; contract, $2.50; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; smaller lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; smaller lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High - Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

Ferrovanadium: V 0.35-0.55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 13.80c, ton lots 14.30c, smaller lots 14.80c; 75%, c.l. 11.05c, ton lots 11.65c, smaller lots 12.25c; 50%, c.l. 9.00c, ton lots 9.65c, smaller lots 10.30c. Deduct 1.00c for bulk, carlots, 80-90% and 90-95%; 1.05c, 75%; 1.20c, 50%. Prices are fob shipping point, freight allowed, per lb of contained Si.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, smaller lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; smaller lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots. **High carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. **Low carbon,** eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22.00c, 0.2% 21.75c; 0.5% 21.50c, 1% 21.00c, 2% 20.50c; add 1.35c for 2000 lb to c.l.; and 0.65c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l.; western zone, add 0.5c for bulk, c.l.; and 1.85c for 2000 lb to c.l.; carlot packed differential 0.80c. Prices are per lb of contained Cr, freight allowed.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, smaller lots 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, smaller lots 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 21.00c; packed carlot 21.80c, ton lots 22.35c, smaller lots 23.35c, eastern, freight allowed, per pound of contained Cr; 21.40c, 22.20c, 23.00c, and 24.00c, central; 21.50c, 22.30c, 24.20c and 25.20c, western.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, smaller lots 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets, spot Prices per pound of briquets, notched 0.25c higher.

Chromium Metal: 97% min. Cr, max, 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, packed, 16.10c, ton lots 17.60c, smaller lots 18.60c, eastern, freight

allowed; 16.60c, 18.45c, 19.45c, central; 18.65c, 20.20c, 21.20c, western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, lump, packed, carlots 14.60c, ton lots 16.10c, smaller lots 17.10c, eastern, freight allowed; 15.10c, 16.85c, 17.85c, central; 17.15c, 19.00c, 20.00c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 14.50c; 2000 lb to c.l. 16.00c; central zone, 15.10c and 18.25c; western, 15.70c and 20.00c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 14.10c; 2000 lb to c.l. 15.60c; central, 14.70c and 17.85c; western, 15.30c and 19.60c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese Briquets: Containing exactly 2 lb Mn and about ½ lb Si, eastern zone, bulk, c.l. 6.75c, ton lots 7.75c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Silicon Briquets: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.70c, ton lots 5.10c, smaller lots 5.50c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.85c, ton lots 5.25c, smaller lots 5.65c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn., max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy: Contract, 5 tons or more $1.90, 1 ton to 5 tons $2.00, smaller lots $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, smaller lots 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Price per lb of alloy, contract, carlots 13.50c, ton lots 14.25c, smaller lots 15.00c, eastern zone, freight allowed; 13.80c, 15.35c, 16.10c, central; 13.80c, 17.30c, 18.05c, western.

CMSZ Alloys 4 & 5: (Alloy 4—Cr 45-59%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3.00-4.50%; alloy 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%). Prices per lb of alloy, contract, bulk, carlots 14.50c; packed, carlots 15.25c, ton lots 16.00c, smaller lots 16.75c, eastern, freight allowed; 14.80c, 15.55c, 17.10c, 17.85c, central; 14.80c, 15.55c, 19.05c, 19.80c, western.

Zirconium alloy: 12-15%, per lb of alloy, eastern, contract, bulk, carlots 5.50c, packed, carlots 6.05c, ton lots 6.40c, smaller lots 6.75c.

Zirconium alloy: Z 35-40%, eastern, contract, packed, carlots 17.00c, ton lots 17.75c, smaller lots 19.00c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb carlots 6.50c; ton lots packed, 7.00c; 200 to 1999 lb, 7.75c; smaller lots, 8.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carioad 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 98.8%, $3.05, freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% Na_2O; or air dried, 83-85% V_2O_5 and 5.15% Na_2O, $1.10 per lb contained V_2O_5 fob plant freight allowed on quantities of 25 lb and over to St. Louis.

Government Inviting Nonferrous Metals Bids

Asks quotations Sept. 15 for undisclosed quantities of copper, lead and zinc . . . Platinum price reduced

NEW YORK—A request for offerings of copper, lead and zinc to be used to augment the national stockpile of these metals has reportedly been issued members of the industry by the Bureau of Federal Supply, Treasury Department. For security reasons the government's invitation of bids, to be received Sept. 15, did not disclose the amounts of these metals which it will purchase, and bidders must state, in addition to prices, the grades, amounts, sources of material and private consumers to whom it was offered before being quoted the government. This latter provision is in line with the government's policy of buying only when the purchases will not interfere with domestic supply.

The action closely follows the bureau's declaration (STEEL, Aug. 25 issue, p. 142) that an accelerated program of buying for the stockpile would be started during this fiscal year.

COPPER—Government bid invitations were reportedly restricted to electrolytic cathode copper.

Suspension of operations has been ordered at the mine near Mountain City, Nev., of Mountain City Copper Co., a company controlled by Anaconda Copper Mining Co., and dissolution proceedings of the Mountain City company have been authorized. Output of this company, which at one time produced about 30 million pounds of copper yearly, has been declining steadily and one of the chief reasons advanced for the suspension was the Presidential veto of the Premium Price Plan, without which, it was thought, further operations were uneconomical.

Brass and bronze ingot makers last week generally followed the lead of a producer who in the previous week reduced prices from ½ cent to one cent a pound, thus eliminating the price ranges which had been quoted.

Price of electrolytic copper, delivered Connecticut Valley, remains unchanged at 21.50c.

LEAD—Three types of lead are being sought by the government in its stockpiling program: Corroding lead; common desilverized lead; and soft undersilverized lead.

As of Aug. 1 stocks of lead held by smelters and refiners showed an 8026-ton decline from July 1, being reported at 152,221 tons on the later date, compared with 160,247 tons in July. This was the smallest these stocks have been since Aug. 1, 1945, when they totaled 142,330 tons. Total receipts of lead in scrap and ore by smelters, only, likewise showed a decrease, dropping from 48,747 tons in June to 41,207 tons in July. The July receipts, however, brought the seven-month total to 311,815 tons, a sharp increase over the 245,049 tons which were received by smelters in the corresponding period of last year.

Prices for common grade were unchanged last week at 14.80 to 14.85c, St. Louis.

ZINC—Types of zinc which will be considered by the government in its stockpiling program are special high grade and/or high grade.

Stocks of slab zinc in the United States totaled 190,917 tons at the end of August compared to 183,718 at the end of the previous month, according to the American Zinc Institute. Last month's stocks were the highest since November, 1946, and did not include large supplies held by the government in the form of concentrates and ore.

Production of slab zinc in American smelters totaled 66,852 tons in August, compared with 69,128 tons in July; shipments were slightly lower, totaling 59,653 tons, against 59,737 tons in July. Unfilled orders at the end of last month were 40,028 tons, likewise below backlogs of 44,955 tons on July 31.

The price for 60 per cent zinc concentrates in the Tri-State district was established last week on the open market at $70.35 per ton. Eagle-Picher Mining & Smelting Co., Joplin, Mo., continued, however, to pay $72 per ton for concentrates shipped to its Central mill.

TIN—Reconstruction Finance Corp. recently bought 700 tons of Chinese tin on arrival in New York from Rangoon, Burma. Price paid was 77½ cents ex dock, New York, for the 99 to 99.5 per cent grade. RFC's purchases of tin thus far this year total 19,805 tons, exclusive of ore and concentrates, for 1947 delivery. Largest portion of this total, 9450 tons, comprises Straits tin.

Office of Materials Distribution reports the limiting factor in tin plate production this year is steel rather than tin. Stocks of the latter metal, however, have dropped some 12,000 tons from the level of Jan. 1, with this drop expected to be offset somewhat by tonnages now en route to this country.

Imports of new tin in the second quarter amounted to 6581 tons, of which 6051 tons was in concentrate and 530 in pig, according to OMD. In addition, domestic production from detinning operations was 675 tons and tin alloy scrap receipts totaled 5689 tons, bringing total available supplies for second quarter to 12,945 tons.

During second quarter, consumption totaled 21,536 tons, compared with 22,780 in the first quarter and 21,418 tons in the second quarter of last year. There was a decline in almost all categories of consumption except tin plate, notably in tin use for copper base alloys, solder and bearing metal. For the remainder of the year it is intended to maintain tin consumption at about first and second quarter levels, with anticipated deficits in new supply being absorded from government stocks.

PLATINUM—Price of platinum has retreated $2 an ounce, bringing the new price to $64 per ounce, wholesale, and $67 an ounce, retail. The previous price had been in effect only since Sept. 3. The reduction by a leading domestic refiner is attributed to an easier supply situation, resulting from reported offering of Russian platinum.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 21.50c, delivered Conn.; Lake, 21.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, nom., refinery, 20,000 lb or more; nom., less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 18.00c; 88-10-2 (No. 215) 26.25c; 80-10-10 (No. 305) 22.00c; No. 1 yellow (No. 405) 14.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than carloads.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 14.00-14.50c; No. 12 foundry alloy (No. 2 grade) 13.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.50c; grade 2 (92-95%) 12.75c; grade 3 (90-92%) 12.00-12.25c; grade 4 (85-90%) 11.50-11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, about 20 lb), 10,000 lb and over, 20.50c; 2000 to 9999 lb, 21.50c; 100 to 1999 lb, 22.50c. Extruded rounds, 12 inches long, 1.312 inches in diameter, less than 25 lb, 52.00c-56.00c; 25 to 99 lb, 42.00c-46.00c; 100 to 4000 lb, 35.00c-36.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 80.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 79.85c; Grade C, 99.65-99.79% incl. 79.55c; Grade D, 99.50-99.64% incl., 79.40c; Grade E, 99-99.49% incl, 78.90c: Grade F, below 99% (for tin content), 78.70c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c, effective as of Mar. 15. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35.00c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $83-$85 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $17 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb. del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 lb for 550 lb (keg); $1.67 lb for 1000 lb (case); $1.72 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y., 70.25c, per ounce.

Platinum: $64-$67 per ounce.

Palladium: $24 per troy ounce.

Iridium: $80-$90 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 21.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 33.68c; yellow brass 29.63c; commercial bronze, 95% 33.72c, 90% 33.11c, red brass, 85% 31.99c, 80% 31.38c; best quality 30.64c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 38,46c; nickel silver, 18%, 42.49c; phosphor bronze, grade A, 5%, 52.00c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.39c; commercial bronze, 95% 33.41c, 90% 32.80c; red brass, 85% 31.68c, 80% 31.07c; best quality 30.33c.

Seamless Tubing: Copper 33.72c; yellow brass 32.39c; commercial bronze 90% 35.52c; red brass 85% 34.65c, 80% 34.04c; best quality brass 33.05c.

Wire: Yellow brass 29.92c; commercial bronze, 95% 34.01c, 90% 33.40c; red brass, 85% 32.28c, 80% 31.67c; best quality brass 30.93c.

Copper Wire: Bare, soft, fob eastern mills, carlots 27.72c, less carlots 28.22c; weatherproof, fob eastern mills carlots 28.12c, less carlots 28.62c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88c.

Aluminum Sheets and Circles: 2s and 3s flats, mill finish, base 30,000 lb or more, fob shipping point. Actual transportation charges (not to exceed lowest carload rail freight rate) are deducted on orders for domestic delivery of 500 lb or more of one product to one destination. Widths from 12 in. and diameters from 9 in. to indicated maximum sizes. Prices, cents per lb, effective Jan. 30, 1947.

B. & S. Gage	Max. Width or Diam.	Sheet Base	Circle Base
0.0249"-7	48"	23.70	26.20
8-10	48"	24.20	26.70
11-12	26"	24.70	27.50
13-14	26"	24.90	27.90
15-16	26"	25.10	28.20
17-18	26"	25.40	28.60
19-20	24"	25.70	29.00
21-22	24"	26.10	29.50
23-24	24"	26.60	30.20
25	24"	27.10	30.90
26	24"	27.80	31.90
27	24"	28.50	33.00
28	24"	29.20	33.70
29	24"	30.00	34.70
30	24"	30.80	35.80

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq. ft; 75c, 10 to 20 sq ft and circles. Pipe: Full coils 17.50c; cut coils 17.75c. Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 21.00c; 5 tons and over 21.50c; 1 to 5 tons, 22.00c; less than 1 ton, 22.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Carbonate: 52-54% metallic Cu, 50 lb bags, 26.50c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15,00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 3000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c, add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 20.00c.

Tin Anodes: Bar, 1000 lb and over 92.50c; 500 to 1000 lb, 93.00c; 200 to 500 lb, 93.50c; less than 200 lb, 95.00c; ball, 1000 lb and over, 94.75c; 500 to 1000 lb, 95.25c; 200 to 500 lb, 95.75c; less than 200 lb, 97.25c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbl, price on application.

Sodium Stannate: To all consumers: in 200 or 500 lb drums, 49.50c; 100 lb, 50.50c; 50 lb, 55.00c; 25 lb, 57.50c.
To consumers other than automobile, radio and refrigerator makers: 1500 lb, 45.85c; 600 to 1400 lb, 48.50c.
To automobile, radio and refrigerator makers: 10,000 lb and over, 44.50c; 2000 to 9999 lb, 45.50c; 1000 to 1999, 46.50c; 600 to 999 lb, 48.50c.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland; 35.00c, fob Niagara Falls.

Scrap Metal

BRASS MILL ALLOWANCE

(Based on 21.50c, Conn., for copper)

Prices for less than 15,000 lb fob shipping point. Add %c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.063
Phos. bronze, A, B	20.000	19.750	18.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 13.00-13.50, auto radiators 9.75-10.00, heavy yellow brass 9.00-9.50, brass pipe 9.75-10.25.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.25-18.50, No. 2 copper, 17.00, light copper, 16.00, refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 13.125.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 15.50-16.00, No. 2 14.50-15.00, light copper 13.50; No. 1 composition red brass 11.00-11.50, No. 1 composition turnings 10.50-11.00, mixed brass turnings 6.00, new brass clippings nom. 10.00, No. 1 brass rod turnings 9.00, light brass 5.50, heavy yellow brass 6.50-7.00, new brass rod ends 9.50, auto radiators, unsweated 7.50, cocks and faucets 8.00-8.50, brass pipe 8.00-8.50.

Lead: Heavy 10.50-11.00, battery plates 6.50-7.00, linotype and stereotype 12.25-12.50, electrotype 10.75-11.00, mixed babbitt 10.75-11.00, solder joints 15.50-16.00.

Zinc: Old zinc 5.00-5.25, new die cast scrap 3.25-3.50, old die cast scrap 2.50.

Tin: No. 1 pewter 50.00-52.00, block tin pipe 67.00-68.00, auto babbitt 40.00-42.00, No. 1 babbitt 40.00-43.00, siphon tops 40.00-42.00.

Aluminum: Clippings, 2S, 7.50-8.00, old sheets 6.00, crankcases 6.00, borings and turnings 2.00, pistons, free of struts, 5.00.

Nickel: Anodes 16.00-17.00, turnings 12.50-13.00, rod ends 16.00-17.00.

Monel: Clippings 12.00-12.50, turnings 7.00-7.25, old sheet 10.00-10.50, rods 10.00-10.50, castings 9.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$38.00
No. 2 Heavy Melt. Steel	38.00
No. 1 Busheling	38.00
Nos. 1, 2 and 3 Bundles	38.00
Machine Shop Turnings	32.50-33.00
Mixed Borings, Turnings	32.50-33.00
Short Shovel Turnings.	34.00-34.50
Cast Iron Borings	33.00-33.50
Bar Crops and Plate	45.50-46.50
Low Phos. Steel	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Cut Structurals	44.50-45.50
Elec. Furnace Bundles.	43.50-44.50
Heavy Turnings	36.50-37.50

Cast Iron Grades

No. 1 Cupola	43.00-43.50
Charging Box Cast.	40.50-41.50
Heavy Breakable Cast.	36.50-37.50
Stove Plate	34.50-35.50
Unstripped Motor Blocks	38.00-39.00
Malleable	49.50-50.50
Brake Shoes	35.00-36.00
Clean Auto Cast	40.00-41.00
No. 1 Wheels	42.00-42.50
Burnt Cast	32.00-33.00

Railroad Scrap*

No. 1 R.R. Heavy Melt.	42.00-42.50
R.R. Malleable	50.00-51.00
Axles	42.00-43.00
Rails, Rerolling	43.00-44.00
Rails, Random Lengths	41.00-41.50
Rails, 3 ft and under.	46.00-47.00
Rails, 18 in. and under	46.00-47.00
Railroad specialties	47.50-48.00
Uncut Tires	46.00-46.50
Angles, Splice Bars	45.00-46.00

*Brokers buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$38.00-38.50
No. 2 Heavy Melt. Steel	38.00-38.50
No. 1 Busheling	38.00-38.50
Nos. 1 & 2 Bundles	38.00-38.50
Machine Shop Turnings	31.00-31.50
Mixed Borings, Turnings	31.50-32.00
Short Shovel Turnings.	31.50-32.00
Cast Iron Borings	31.50-32.00
Bar Crops and Plate	41.00-41.50
Cast Steel	43.00-44.00
Punchings & Plate Scrap	41.00-41.50
Heavy Turnings	37.00-37.50
Alloy Free Turnings	33.00-33.50
Cut Structurals	41.00-41.50

Cast Iron Grades

No. 1 Cupola	43.50-44.00
Charging Box Cast.	41.00
Stove Plate	41.00-41.50
Heavy Breakable Cast.	40.00
Unstripped Motor Blocks	40.00
Malleable	56.00-57.00
Brake Shoes	42.00
Clean Auto Cast	46.00
No. 1 Wheels	44.00
Burnt Cast	41.00-41.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.00-41.50
R.R. Malleable	56.00-57.00
Rails, Rerolling	44.00
Rails, Random Lengths	44.00
Rails, 3 ft and under.	48.00
Railroad Specialties	46.00
Uncut Tires	43.00
Angles, Splice Bars	48.00

VALLEY

No. 1 Heavy Melt. Steel	$38.00-40.00
No. 2 Heavy Melt. Steel	38.00-40.00
No. 1 Bundles	38.00-40.00
Machine Shop Turnings	34.00-35.00
Short Shovel Turnings.	34.00-35.00
Cast Iron Borings	34.00-35.00
Low Phos.	44.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.00-43.00

MANSFIELD

No. 1 Heavy Melt. Steel	$40.00
Machine Shop Turnings	35.00
Short Shovel Turnings.	36.00-37.00

CINCINNATI

No. 1 Heavy Melt. Steel	$37.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
No. 1 Bundles	37.00
No. 2 Bundles	37.00
Machine Shop Turnings	31.00
Mixed Borings, Turnings	30.00
Short Shovel Turnings.	33.00
Cast Iron Borings	32.00

Cast Iron Grades

No. 1 Cupola Cast	47.00
Charging Box Cast.	41.00
Heavy Breakable Cast.	40.00
Stove Plate	38.00
Unstripped Motor Blocks	38.00
Brake Shoes	35.00
Clean Auto Cast	46.00
Drop Broken Cast	50.00

Railroad Scrap

No. 1 R.R. Heavy Melt	40.00
R.R. Malleable	57.00
Rails, Rerolling	46.00
Rails, Random Lengths	44.00
Rails, 18 in. and under	50.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1 & 2 Bundles	34.50-35.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings	27.50-28.00
Mixed Borings, Turnings	27.50-28.00
Short Shovel Turnings.	28.50-29.00
Cast Iron Borings	28.50-29.00
Punchings & Plate Scrap	39.00-39.50

Cast Iron Grades

No. 1 Cupola Cast	39.00-40.00
Heavy Breakable Cast.	33.00-34.00
Clean Auto Cast	39.00-40.00

BUFFALO

No. 1 Heavy Melt. Steel	$39.00-40.00
No. 2 Heavy Melt. Steel	37.00-38.00
No. 1 Busheling	37.00-38.00
No. 1 & 2 Bundles	37.00-38.00
Machine Shop Turnings	29.50-30.50
Mixed Borings, Turnings	29.50-30.50
Cast Iron Borings	29.50-30.50
Short Shovel Turnings.	30.50-31.50
Low phos	40.50-41.50
Elec. Furnace Bundles.	39.50-40.50

Cast Iron Grades

No. 1 Cupola Cast	40.00-41.00
Heavy Breakable Cast.	35.00-36.00
Malleable	48.00-50.00
No. 1 Wheels	41.00-42.00

Railroad Scrap

Rails, 3 ft and under.	45.00-46.00
Railroad Specialties	46.00-47.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$36.50-37.00
No. 2 Heavy Melt. Steel	36.50-37.00
No. 1 Busheling	36.50-37.00
No. 1 Bundles	36.50-37.00
No. 2 Bundles	36.50-37.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings	28.50-29.50
Mixed Borings, Turnings	28.50-29.50
Short Shovel Turnings.	29.50-30.00
Bar Crops and Plate	41.00-42.00
Punchings & Plate Scrap	41.00-42.00
Cut Structurals	41.00-42.00
Elec. Furnace Bundles.	40.00-41.00
Heavy Turnings	39.00-40.00
No. 1 Chemical Borings	35.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	45.00-46.00
Charging Box Cast	45.00-46.00
Heavy Breakable Cast.	44.00-45.00
Unstripped Motor Blocks	40.00-41.00
Malleable	57.00-58.00
Clean Auto Cast	46.00-47.00
No. 1 Wheels	46.50-47.50

NEW YORK

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$32.00
No. 2 Heavy Melt. Steel	32.00
No. 1 Busheling	32.00
Nos. 1 & 2 Bundles	32.00
No. 3 Bundles	31.00
Machine Shop Turnings	25.00-25.50
Mixed Borings, Turnings	25.50-26.00
Short Shovel Turnings.	27.00
Punchings & Plate Scrap	34.00-35.00
Cut Structurals	34.00-35.00
Elec. Furnace Bundles.	33.00
No. 1 Chemical Borings	24.50-25.00

Cast Iron Grades

No. 1 Cupola Cast	37.50-38.00
Charging Box Cast.	37.50-38.00
Heavy Breakable	37.50-38.00
Unstripped Motor Blocks	35.00-36.00
Malleable	54.00-55.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$29.50-30.50
No. 2 Heavy Melt. Steel	29.50-30.50
Nos. 1 & 2 Bundles	29.50-30.50
No. 1 Busheling	29.50-30.50
Machine Shop Turnings	24.00-25.00
Mixed Borings, Turnings	25.00-26.00
Short Shovel Turnings.	26.00-27.00
Bar Crops and Plate	32.00-33.00
Punchings & Plate Scrap	32.00-33.00
Chemical Borings	25.00-26.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast.	38.00-39.00
Heavy Breakable Cast.	38.00-39.00
Stove Plate	35.00-36.00
Unstripped Motor Blocks	35.00-36.00
Clean Auto Cast	40.00-42.00

CHICAGO

No. 1 Heavy Melt. Steel	$38.50-39.00
No. 2 Heavy Melt. Steel	38.50-39.00
No. 1 & 2 Bundles	38.50-39.00
No. 3 Bundles	36.50-37.00
Machine Shop Turnings	33.50-34.00
Mixed Borings, Turnings	33.50-34.00
Short Shovel Turnings.	35.50-36.00
Cast Iron Borings	34.50-35.00
Bar Crops and Plate	41.00-41.50
Cast Steel	41.00-41.50
Punchings	41.00-41.50
Elec. Furnace Bundles.	39.50-40.00
Heavy Turnings	38.00-38.50
Cut Structurals	41.50-42.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-45.00
Malleable	42.00-45.00
Clean Auto Cast	42.00-45.00
No. 1 Wheels	42.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.00-40.50
Rails, Rerolling	46.00-46.50
Rails, Random Lengths	41.50-42.00
Rails, 3 ft. and under.	44.00-44.50
Rails, 18 in. and under	44.50-45.00
Railroad Specialties	43.00-43.50
Angles, Splice Bars	43.00-43.50

ST. LOUIS

No. 1 Heavy Melt. Steel	$39.50-40.50
No. 2 Heavy Melt. Steel	38.50-39.50
Machine Shop Turnings	32.00-33.00
Short Shovel Turnings.	34.00-35.00

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	42.00-43.00
Charging Box Cast.	39.00-40.00
Heavy Breakable Cast.	35.00-36.00
Brake Shoes	37.00-38.00
Clean Auto Cast	42.00-43.00
Burnt Cast	35.00-37.00

Railroad Scrap

R.R. Malleable	54.00-55.00
Rails, Rerolling	45.00-46.00
Rails, Random Lengths	42.00-43.00
Rails, 3 ft and under.	45.00-46.00
Uncut Tires	43.50-44.50
Angles, Splice Bars	43.00-44.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$34.00-35.00
No. 2 Heavy Melt. Steel	34.00-35.00
No. 1 Busheling	34.00-35.00
Nos. 1 & 2 Bundles	34.00-35.00
No. 3 Bundles	31.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.50
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	41.00
Stove Plate	39.00
No. 1 Wheels	36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	37.00
R.R. Malleable	42.50
Axles, Steel	38.00
Rails, Rerolling	41.00
Rails, Random Length.	39.00
Rails, 3 ft and under.	41.00
Angles and Splice Bars.	41.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$22.00
No. 2 Heavy Melt. Steel	*22.00
No. 1 Busheling	*22.00
Nos. 1 & 2 Bundles	*22.00
No. 3 Bundles	*17.00
Machine Shop Turnings	*12.50
Bar Crops and Plate	22.00
Cast Steel	22.00
Alloy Free Turnings	12.50
Cut Structurals	22.00
Tin Can Bundles	17.00

Railroad Scrap

Axles	29.00
Rails, Random Lengths	23.50
Uncut Tires	30.50

*Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	22.00
Nos. 1 & 2 Bundles	22.00
No. 3 Bundles	20.00
Machine Shop Turnings	13.50
Mixed Borings, Turnings	13.50
Punchings & Plate Scrap	23.50
Cut Structurals	23.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast.	22.50
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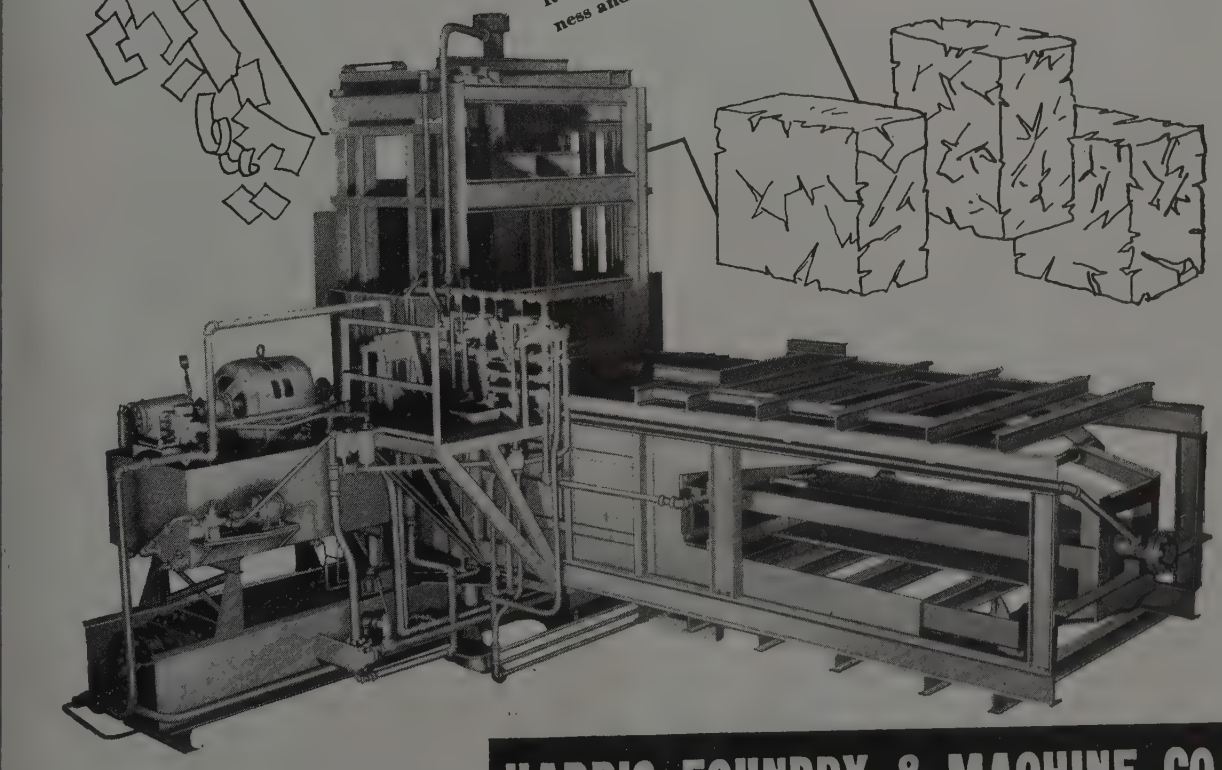
The Harris 4 A Baler is not comparable to any other press due to its revolutionary design. This incorporates 1—The vertically operating tramper door which means continuous operation in that a charge can be loaded while a bundle is being compressed. 2—The Harris 4 A Baler is equipped throughout with micromatic honed cylinders which means perfect concentricity and extremely close tolerances. This greatly increases the life of all packings as well as the life of the machine itself and gives a smooth operation. 3—The Harris 4 A Baler is equipped with Vickers vane-type rotary pumps and ultra modern valve equipment.

The Harris 4 A Baler located adjacent to your railroad siding is easily adaptable to conveyor equipment for delivering scrap to the press and the finished bundles to the car with an absolute minimum of labor. This reduces the production cost of bundles amazingly, and means: 1—Reduction in labor cost; 2—Increased profits; 3—Safety; 4—Cleanliness and orderliness in your plant.



Harris Scrap Metal Baling Press Model 4 A

HARRIS FOUNDRY & MACHINE CO.

Reclamation Engineers Since 1889

CORDELE, GEORGIA

Sheets, Strip . . .

Consumers see little hope for increased allocations despite end of holiday season

Sheet Prices, Page 152

New York — With the vacation season over, sheet consumers are pressing harder than ever for tonnage, but with relatively little effect, despite the fact producers themselves have their vacation and the hot weather season behind them and should be in a position soon to step up their output in a limited degree, dependent upon supplies of raw materials, such as pig iron, scrap and coke in particular. Momentarily at least labor troubles in the Pittsburgh area are serving to offset any seasonal advantage that might be gained at this time.

Boston — Cold-roll strip mills lack hot-rolled material to make progress against backlogs expected, and two producers have curtailed output to the extent of steel available for processing. Where steel is sufficient shipments are slightly in excess of incoming volume. Sheet allocations for fourth quarter are being revised downward frequently and shortages will continue well into next year. Only stainless balances demand.

Philadelphia — Sheet deliveries into this district are being adversely affected by the rail strike in Pittsburgh, further complicating an already stringent situation at many of the local sheet fabricating plants. Various consumers, particularly the older ones with established mill connections, are receiving fair quantities of hot and cold rolled sheets, but far less than they could use, and some are not receiving nearly as much as they did before the war because of the withdrawal or partial withdrawal of their midwestern suppliers.

Pittsburgh — Carnegie-Illinois Steel Corp. was able to maintain fairly good production schedules on sheets and strip at its Irvin and Vandergrift plants here last week despite the wildcat strike of the company's Union Railroad employees. However, this production pace was at the expense of limited stock of slabs and coils, while shipments of finished products were restricted to truck delivery. Sharp curtailment in production schedules at these plants is indicated early this week if the strike is not settled.

Chicago — Shortage of sheets and strip appears to be growing more acute and producers are being pressed harder by consumers. The overall picture has been darkened by the suspension of steelmaking activity in the Pittsburgh district because of the strike of railroad workers, it being felt that some of the tonnage rolled here will move East to alleviate the growing shortage there.

Cincinnati — Sheet mills have stepped up production wherever possible in an effort to cut carryover to a minimum but tonnage gained will not mean expansion of fourth quarter allotments. Greatest lag in deliveries is in enameled and cold-rolled sheets.

St. Louis — If present production improvement continues, backlogs of sheet steel will be cleaned up by the end of the fourth quarter it is believed here. Mills are sufficiently optimistic of getting abreast that they plan to open first quarter books by the end of this month. There has been no decrease in demand, however, and they have gotten current simply by refusing orders most of this year.

Tin Plate . . .

Tin Plate Prices, Page 153

Pittsburgh — Moderate stocks of slabs and coils enabled Carnegie-Illinois Steel Corp. to sustain tin plate output at a fairly good rate last week despite the wildcat strike of Union Railroad employees which forced complete shutdown of most of the company's primary steel production and finishing mill facilities. However, tin plate shipments at the Irvin Works were restricted to truck deliveries, with remainder of output going into stock.

Steel Bars . . .

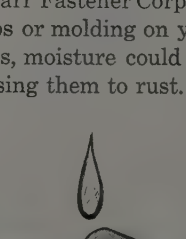
Bar Prices, Page 152

Pittsburgh—Output of all bar classifications at Carnegie-Illinois Steel Corp.'s plants here was stopped last week due to the wildcat strike of the company's Union Railroad employees. This situation has not yet adversely affected independent cold-finishers' production schedules, but likely will this week if the strike is not settled.

New York — While alloy bars are in easy supply, deliveries ranging 4 to 5 weeks, and cold drawn carbon bars are generally easier than they were a few months ago, the situation in hot carbon bars has shown little change for some time. The small sizes appear about as scarce as at any time this year and the demand for medium sizes over the past few months has remained relatively un-

This strip teaser we had was a lulu! The United-Carr Fastener Corporation makes fasteners which secure chrome strips or molding on your new automobile. Before Darex* Sealing Compounds, moisture could run under the molding and inside the door panels causing them to rust.

Dewey and Almy engineered this problem by applying a Darex "Flowed In" Sealing Compound which forms a gasket and closes off all spaces in the fastener through which water can seep. Now United-Carr's fasteners aid greatly in keeping moisture outside the automobile body. And the chrome strips remain secure, yet can be easily snapped out and replaced when necessary.



In this unusual application a few drops of liquid Darex Lining Compound are squirted into the fastener. Upon baking, the compound puffs up to fill the hole with a spongy, watertight gasket.

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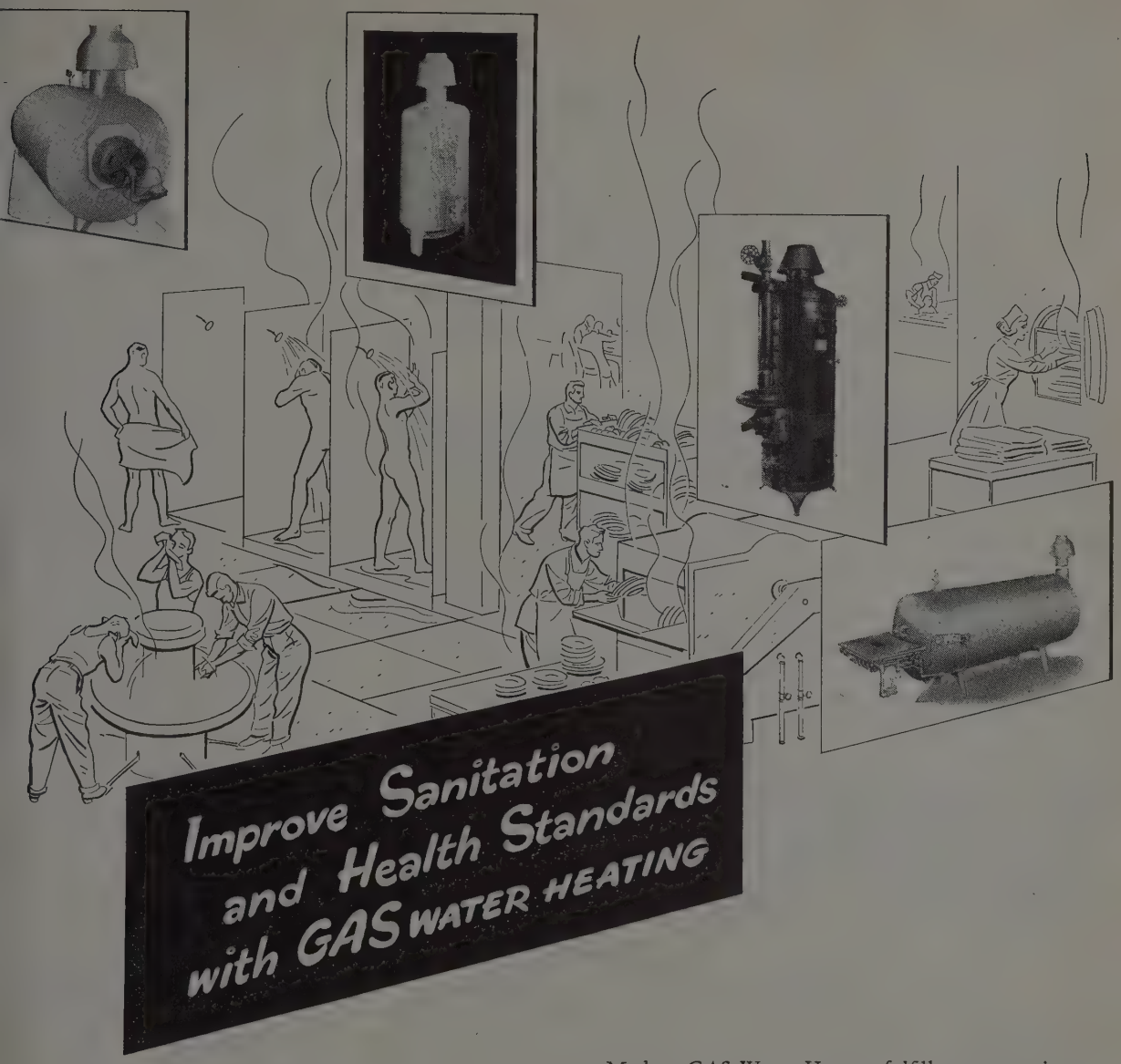

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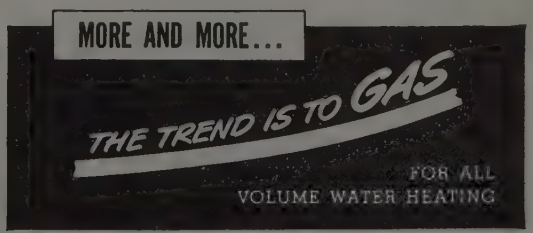


changed.

Philadelphia — Trade comment on hot carbon bars is somewhat conflicting. Some consumers report a little easier supply, while others regard the situation at least as tight as ever. One point on which all agree is that there is no easing as yet in the small sizes of rounds and flats.

Chicago — Producers of carbon bars are mystified by the recent increased demand for carbon bars in all sizes. Until a short time ago, large sizes had shown growing easiness and it had been anticipated that smaller sizes might follow. Now, however, consumers in all industries are pressing for faster shipments and increased quotas.

St. Louis — Producers continue under extremely heavy pressure for merchant bars, but concrete bar demand has eased to the point they are available in 30 days in limited quantities. Merchant bar schedules are filled beyond the end of the year. General mill policy of refusing many orders has prevented a backlog extending through 1948.

Plates . . .

Plate Prices, Page 153

Boston — Unless there is a revision in shipping schedules for railroad car building, other plate fabricators look for little increase in tonnage through balance of this year. Builders of light tanks lack carbon plates in smaller gages for attainment of planned schedules. Departments fabricating flanged and dished work are heavily loaded and this branch is accounting for a good slice of plate mill tonnage.

New York — Stringency in plates continues with little early improvement in sight. Most mills will have carryovers at the end of this quarter ranging from three to five weeks, with one exception on the lower side, one producer figuring he will be no more than a week or 10 days behind on his commitments, and one or two on the upper side who appear to be indefinitely farther behind.

Philadelphia — Plate demand continues to exceed supply, and with producers well scheduled for the remainder of the year and accepting little for delivery beyond—in fact, most are accepting nothing—new orders are light. Consumers declare their mill quotas for fourth quarter are no larger and some report they are actually smaller.

St. Louis — Plates continue in sharp demand but there is some easing from railway car manufacturers. No plates are booked beyond year-end, owing to the refusal of mills so far to accept orders into 1948. Generally speaking, none have been taken since the second quarter. Granite City Steel will open its books on plates about the end of September.

Structural Shapes . . .

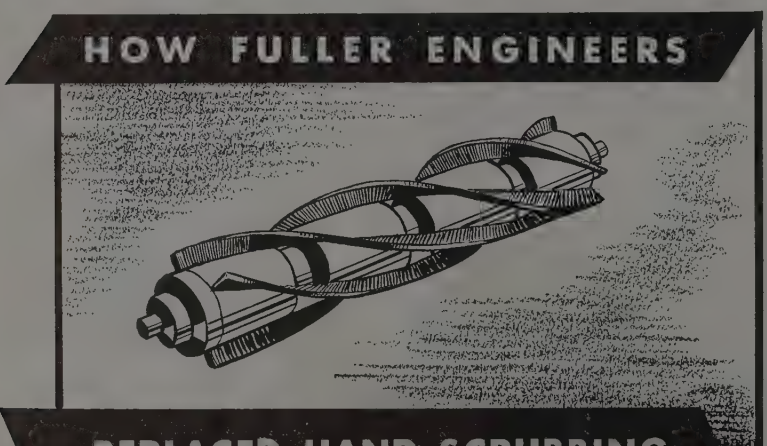
Structural Shape Prices, Page 153

Philadelphia — American Bridge Co is low on the steel contract, South Capitol St. bridge superstructure, Washington, D. C., at $2,329,043.50. Bethlehem Steel Co., Baltimore, was second, $2,473,367, and Mount Vernon Bridge Co., Mount Vernon, O., third, at $2,501,155. American Bridge Co. bid 17.30c per pound on 2300 tons of structurals in the main bridge, a total of $795,800. Unit bids on other steel and metal work included: Structurals in approaches 1900 tons 15.20c per lb, toal $577,600; machinery in swing span, etc., 100 tons, 68.90c per lb, total $137,800; reinforcing steel in place, 350 tons, 11.65c per lb, total $81,550; metal bridge railings, 7700 linear ft, $19.00 per ft, total $146,300; roadway grating in swing span, 16,000 sq ft, $3.45 per sq ft, total $55,200.

New York — Structural demand is livelier, with some fairly sizable jobs reported, including a 1620-ton building here, and more work coming up for bids. Trade leaders believe the situation is building up to a highly active market by next spring. Meanwhile, larger fabricators appear booked up solidly six to seven months in advance.

Boston — Structural tonnage scheduled to be rolled in the Pittsburgh district early this month for at least one sizable New England industrial project under contract may be slightly delayed. There is no overall imiprovement in plain material supply and several district distributors are out of structurals.

Chicago — With structural fabricators unable to get sufficient plain shapes from mills, and already running behind commitments, they ignore a good portion of the new business coming out for bids. Order backlogs range up to sever or eight months. Fabricators recently suffered loss in delivery of large sections when Carnegie-Illinois Steel Corp. was forced to shut down its 52-inch structural mill at South Chicago from Aug. 21 to Sept. 1 for general repairs. There is also a growing fear that the forced closing of some Pittsburgh steel plants because of a strike of railroad workers will further reduce tonnage of shapes.



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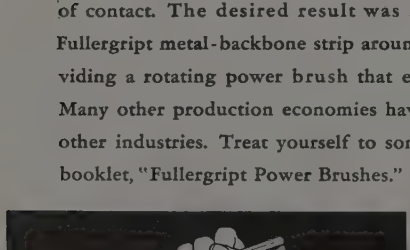

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Wire . . .

Wire Prices, Page 153

Pittsburgh — American Steel & Wire Co.'s operations at its Donora and Rankin plants were not affected by the wildcat strike last week of employees of Union Railroad Co., which handle the switching at Carnegie's plants here. Very heavy demand continues for all merchant wire products. However, demand for some wire items, such as electric welded mesh and wire rope, has eased considerably and is no longer under strict shipment allocation.

New York — Fourth quarter allocations, about equal to third, will generally be taken out by consumers. Demand is slightly more active with welding wire, wool and upholstery wire included. Nail demand is heavy, and stocks are depleted. Advertised at New York are 300,000 kegs, 15,000 tons, 8 to 30 pennyweight, mill delivery to start December, 1947, and constituting 12 equal monthly shipments. In view of the tightest kind of open market supply, this offering of 300,000 kegs is startling.

Boston — Among the few but important products on which delivery and supply has improved, is music wire; springmakers and others using that grade can get shipments from stock in some sizes. Incoming orders for wire are heavier than last month with shipments and new volume about equal. Rod wire for flattening, notably alloys, and most spring wire demand has eased slightly. Rod supply has also improved, but semi-finished is still a production problem with non-integrated mills.

Chicago — Requirements for virtually all categories of wire exceed production by a good margin, mill backlogs are substantial, and there is no indication that anything resembling reasonable balance can be attained any time soon. Bale ties and baling wire, as well as heavier fencing, head the list of short merchant products.

Pig Iron . . .

Pig Iron Prices, Page 154

New York—District foundries continue hard pressed for pig iron and coke, and little improvement in supply of either material is likely this month. This situation seems to be widespread throughout the country, with some local pig iron sellers, for instance, receiving inquiries from various midwestern states.

Boston — No class of pig iron consumers is harder pressed for supply than users of basic. Two steel works are dependent on Buffalo iron and producers in that area are hard put to cover their own and nearby requirements. Basic melters here manage to maintain open hearth schedules, but at times are dangerously low between deliveries. There is slight pendent on Buffalo iron, and producers in fourth quarter and consumers will again enter the winter with low inventories.

Pittsburgh — Electric furnace silvery iron prices were advanced $3.75 per gross ton at Jackson, O., and Niagara Falls, N. Y., Sept. 1. New prices are $72.50, Jackson and $73.75 at Niagara Falls.

Buffalo—While big melters press for more pig iron to meet heavy production schedules, operations of some smaller jobbing foundries in the district are interrupted occasionally by lack of orders. Overall demand, however, is far above supply and recently a few central New York foundries paid almost $60 a ton, delivered, to bring in iron from Colorado.

Chicago — Already unable to obtain enough pig iron to meet their requirements, foundries now fear the iron output now being lost in the Pittsburgh district because of the strike of railroad workers is shortly going to be felt here. Sellers are distributing their supplies strictly according to quotas and foundries are forced to gear their operations to day-by-day receipts. Of the 42 blast furnaces in this district, 39 are operating. Inland Steel Co expects to relight its repaired and relined No. 3 stack at Indiana Harbor, Ind., about Sept. 25, at which time it will switch another furnace from basic to merchant iron.

Cleveland — Price of pig iron, as established weekly by a leading producer here on the basis of the published price for heavy melting steel scrap, remained unchanged last week at $38.25 for basic. Other producers continued to quote $35.50 for that grade.

Cincinnati—Shipments of pig iron are steady, but far under district needs. Order backlogs for castings is large and hence foundries are constantly exerting pressure for more iron. The situation in southern iron is particularly tight.

Tubular Goods . . .

Tubular Goods Prices, Page 153

Boston — Steel pipe mills are opening books in a limited way for direct shipments in first quarter of 1948. Indica-

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tions are pipe, notably in butt weld sizes, will be in limited supply under rigid allocation for some time. Fourth quarter quotas are no heavier and prospects are the same for the first. With no more steel in sight, revisions within allotments increasing tonnage to some will be at the expense of others. Utilities especially are estimating heavier requirements and there is no letdown in demand from pipe fabricating shops, some already overcommitted on current quotas.

Pittsburgh — Production schedules at National Tube Co.'s plants here were not adversely affected by the wildcat strike by employees of U. S. Steel Corp.'s Union Railroad. However, this strike forced complete cessation of seamless tube bloom output at Carnegie's plants resulting in curtailment of pipe production among some of its customers' plants. Spang-Chalfant Division of National Supply Co was immediately forced to reduce operating schedules at its Ambridge seamless pipe mill and this plant will shut down early this week if the strike is not settled.

St. Louis — Demand for pipe, particularly small sizes, continues at an unexpectedly high level. Pressure is increasing even though local producers have been operating at virtual capacity for months.

Scrap . . .

Scrap Prices, Page 158

Pittsburgh — Scrap shipments to Carnegie-Illinois plants here were halted last week by the wildcat railroad strike. Scrap already in cars was diverted to the company's Vandergrift plant and other corporation subsidiaries. Carnegie's being out of the market has had no noticeable effect on the $38 heavy melting steel price level. Closing of the Pennsylvania Railroad list rate last week was expected to clarify railroad scrap quotations which at present are out of line with the industrial scrap prices. Most recent published railroad scrap award was at $42.30 for heavy melting steel which was largely shipped to the Youngstown district. Some roller purchases are reported from the Nickle Plate and Erie Railroad for shipment into the East.

Philadelphia — Heavy steel scrap prices again are unchanged, although prices are higher on low phos and most grades of cast, these latter changes coming after more than a fortnight of relative steadiness.

In steel scrap, the leading eastern consumer has held up shipments at Steelton, Pa., and continues its policy of the last few weeks of not going south of Norfolk, Va., for scrap for Sparrows Point. Incidentally, the ship breaking yard of this interest in Baltimore continues closed because of a strike which followed the walkout in major eastern shipyards last June and which is still effective at most yards. As a result of suspended operations at their yard this company has lost an estimated 30,000 tons of scrap so far.

There is still some question as to whether steel scrap prices have reached bottom, especially in the light of somewhat freer movement of material. However, most trade leaders are inclined to think they have. Consumer inventories have increased from the low of several weeks ago, but they should be built up considerably before the winter sets in, particularly in view of the drab outlook for pig iron.

New York — While district brokers are still offering unchanged prices for heavy melting steel and low phosphorus

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FIRST NATIONAL BANK BLDG.
PITTSBURGH 22, PA.

grades, they are paying more for turnings and cast scrap. Brokers assert that scrap is still coming out rather slowly and while there has been no change in major steel mill grades, some assert they would not be surprised to see an advance in the near future.

Boston — High prices paid for government shipyard melting steel scrap are in effect premiums over dealer material. September navy accumulation brought $31.33 for heavy melting steel $28.10 for unprepared and $25.12, light iron. These prices are relatively above the general market, but are for well graded material.

Chicago — Scrap prices in this market continue to hold nominal at the prices which have prevailed for several weeks. Open hearth material is quoted at $38.50 to $39 a ton, delivered consumer, figures which have yet to be tested by extensive buying. Reports of small scattered lots have been heard below this price, but it is suspected that active purchasing by mills would exert a quick strengthening. Brokers and dealers are still filling old orders negotiated at higher prices and it likely will be another week or two before these will be completed. Present flow of scrap is little more than sufficient to meet consumption requirements.

Buffalo — Steadier tendencies developed in scrap prices last week as dealers accepted additional tonnage on orders placed recently on the basis of $37-38 a ton for steelmaking grades. In addition one of the leading mills announced the lifting of a hold up on shipment order which had been in effect for two weeks because of an influx of material against orders placed above the current range.

Cleveland—Scrap buying continues on a limited scale. One important steel mill plans to stay out of the market for some time. This interest has material coming in on $40 contracts to the end of September. Continued resistance to current prices may result in some further weakening in the market, but with winter coming on scrap dealers think supply conditions will deteriorate thus lending price support. Shipments are being made in comfortable volume. Prices are unchanged.

Cincinnati — Iron and steel scrap is more stable than in many weeks. Despite a recent sag in prices, undertone is strong on assumption steelmaking will be maintained at high level. Foundry needs are consistently heavy.

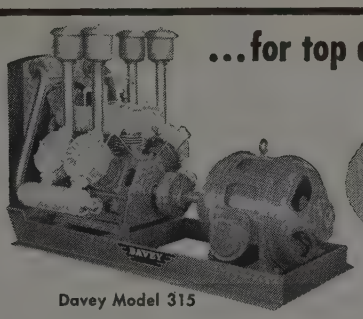
Detroit — Dealers are reported unwilling to sell at current price levels, preferring to pile inventory in anticipation of accelerated pre-winter demands. Outlook will be clarified after Sept. 15 when most high-priced orders will be cleaned up. Auto plants are becoming increasingly dissatisfied with the policy of earmarking scrap for mills in exchange for new steel.

St. Louis — Scrap prices are confused although a measure of order has been restored to the market. Mills are buying and brokers are working to fill old orders. Reserves are improving slightly, averaging 30 to 40 days. Brokers feel prices will remain constant the rest of the month.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 152

Philadelphia — Reinforcing bar demand is featured by several sizable tonnages, including 2330 tons of substructure work for the state bridge on Penrose



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P & P-102

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Ave., this city, 1200 tons for a veterans' hospital, Lebanon, Pa., and 1155 tons for an experimental station for the du Pont interests, Wilmington, Del., which will also require 2320 tons of shapes, as noted in a recent issue.

Chicago — With some suppliers of reinforcing steel already far behind in fulfilling commitments and consequently reluctant to take on additional work, they view the immediate future with pessimism. Indications are that the steel supply situation is growing worse and there is fear that the production lost by Pittsburgh mills last week on account of a railroad strike will further aggravate conditions here.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 154

Philadelphia — While there has been some improvement in the flow of scrap, pressure for pig iron continues as great as ever with little possibility of substantial improvement for some time to come. Meanwhile, there is a little easing in coke, as not only more beehive capacity is coming into production in the Pittsburgh and West Virginia districts, but a better quality of beehive is being produced. When eastern oven foundry coke production was sharply curtailed some weeks ago, due to need of making major repairs at some units the scramble among consumers to obtain beehive coke met with efforts on the part of beehive producers to step up production to meet the demand. Nevertheless, results were not too satisfactory in some cases, especially where increased production was at the expense of adequate coking time. Consequently, numerous cancellations followed and of course production at the consuming plants suffered. However, a better quality of beehive is now being produced generally and more beehive ovens are being placed in operation.

Pittsburgh — Coke output at Carnegie-Illinois Steel Corp.'s Clairton plant was cut back sharply last week to 31 per cent of capacity, due to the wildcat strike of employees on the company's Union Railroad. No let-up in demand for foundry coke is noted, despite further restriction in foundry operations due to critical pig iron shortage. The coke supply situation is expected to become somewhat better following installation of a number of new and rebuilt by-product ovens later this year.

Warehouse . . .

Warehouse Prices, Page 155

Boston — When fourth quarter allocations to warehouses are summarized, the results add up to less steel notably hot-rolled carbon products for which demand is heaviest. Allotments are being reduced for plates, structurals sheets and in one case hot-rolled bars due to limited tonnage of semi-finished; revised quotas are lower by 20 to 50 per cent. Demand for carbon bars is slackening with cold finished inventories now generally sufficient for warehouse demand. In some instances sheet mills are behind shipping schedule on third quarter allocations.

New York—Low inventories on most active hot-rolled carbon steel products limits warehouse sales and will continue through balance of 1947; outlook for improvement in mill tonnage for fourth quarter, is drab notably sheets, strip, plates, structurals and most wire prod-

ucts. Allocations have been revised downward. Only bars show signs of balancing demand and even hot-rolled carbon stock is critical in some small rounds and flats.

Pittsburgh — Some steel distributors will be hard hit by the loss in finished steel output last week resulting from the wildcat strike of Union Railroad Co. employees handling the switching operations at Carnegie-Illinois Steel Corp.'s plants here. Some distributors, having other steel supply sources, report a slight improvement in mill shipments in recent weeks.

Cincinnati—Inventory position of warehouses has not shown improvement over August when sales volume dropped because of inability to make usual deliveries in flat-rolled products, small carbon bars, and structurals. Inquiries indicate absence of any seasonal decline in demand for steel for building.

Iron Ore . . .

Shipments of Lake Superior iron ore in August increased 24 per cent over August, 1946

Iron Ore Prices, Page 154

Cleveland—Shipments of Lake Superior iron ore in August increased 24 per cent over the shipments made in the like month of 1946 with 12,122,244 gross tons dispatched from upper lake ports, against 9,774,442 tons in August, 1946, according to the Lake Superior Iron Ore Association, this city. Details follow:

Port	August, 1947	August, 1946
Escanaba	573,477	495,436
Marquette	659,094	366,201
Ashland	805,652	629,658
Superior	4,246,450	3,340,633
Duluth	2,996,945	2,470,932
Two Harbors	2,506,840	2,236,687
Total U. S. Ports	11,788,458	9,539,547
Michipicoten	62,095	60,201
Port Arthur	271,691	174,694
Total Canada	333,786	234,895
Grand Total	12,122,244	9,774,442

Cumulative shipments to Sept. 1 this year totaled 51,014,783 gross tons, an increase of 52 per cent or 17,391,502 tons from the 33,623,281 tons shipped up to Sept. 1, 1946. Details follow:

Port	To Sept. 1, 1947	To Sept. 1, 1946
Escanaba	2,719,391	1,638,361
Marquette	2,930,955	1,351,251
Ashland	3,482,600	2,145,441
Superior	17,797,796	10,501,585
Duluth	12,138,288	9,160,511
Two Harbors	10,908,582	8,111,389
Total U. S. Ports	49,977,612	32,908,538
Michipicoten	269,941	285,702
Port Arthur	767,230	429,041
Total Canada	1,037,171	714,743
Grand Total	51,014,783	33,623,281

Rails, Cars . . .

Track Material Prices, Page 153

New York — Ordering of freight cars dropped sharply last month to 2376 units, all of which were placed with car builders. During July 14,865 new cars were

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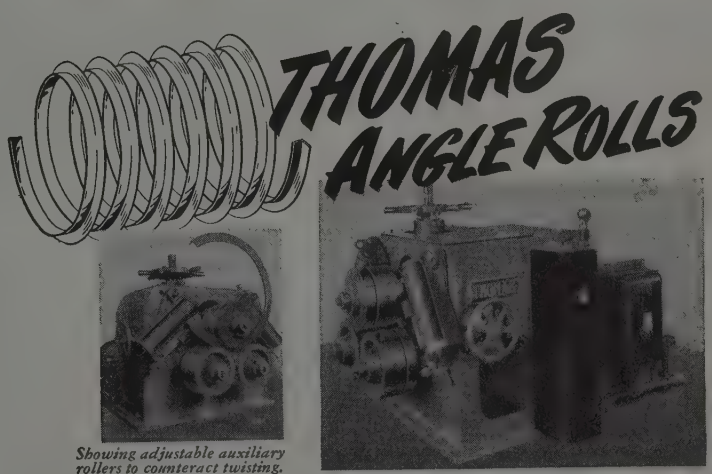

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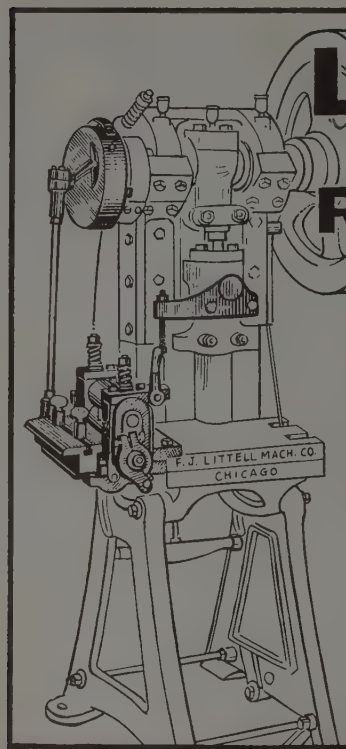

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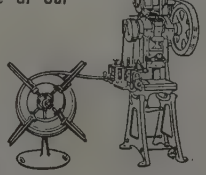

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ordered from car builders and railroad shops. As of Sept. 1, both classes of builders had order backlogs for new freight cars totaling 113,780 units.

Deliveries of domestic freight cars during the month showed a slight increase, however, totaling 5963 in August, compared with 5879 in July.

The following table shows monthly awards:

	*1947	*1946	1945	1944
Jan.	†9,172	1,500	7,200	1,020
Feb.	13,727	2,403	1,750	13,240
March	12,049	4,512	2,500	6,510
April	†8,836	3,764	1,120	4,519
May	7,390	3,025	1,526	1,952
June	†13,084	3,335	670	1,150
July	14,865	14,836	3,500	795
Aug.	2,376	9,629	7,240	3,900
Sept.	....	12,768	12,840	400
Oct.	....	3,407	1,320	2,425
Nov.	....	6,707	1,650	1,065
Dec.	....	3,041	4,116	16,245
Total	....	68,927	45,432	53,221

* American Railway Car Institute. † Revised.

Philadelphia — Pennsylvania Railroad has closed bids on 100,000 to 175,000 tons of rail for delivery in 1948. Last year it inquired for a maximum of 200,000 tons for shipment in 1947, with the mills bidding on less than the full amount. Orders were finally placed for any amount from 129,800 to 175,000 tons, with all indications that the maximum will be delivered. Carnegie-Illinois Steel Corp. took 65,000 to 85,500 tons, Bethlehem Steel Co. 57,200 to 77,000 tons and Inland Steel Co. 7800 to 10,500 tons. These mills are expected to share in somewhat the same ratio in whatever tonnage is placed this year. Bids have not yet been asked for 1948 track accessories.

Pittsburgh — Basic steel producers and metalworking plants, notably in the West, are faced with a growing freight car shortage. Monthly freight car construction falls short of number of cars being scrapped. Complete cessation of stuctural steel plate and carbon bar output at Carnegie-Illinois Steel Corp.'s plants here last week is expected to accentuate the unbalanced inventory position of carbuilders and probably will necessitate some revision in freight car assembly schedules.

High Costs Hitting Steel Mill Modernization Plans

(*Concluded from Page* 60)

by many companies and older batteries are being rebuilt. Three million tons of coke capacity will be added by the end of next year.

Sundry improvements scheduled by a number of producers include facilities for avoidance of stream pollution, abatement of smoke nuisance, oil and coal storage.

Steel Shortages Due to Abnormal Conditions-Tower

Present tightness in the steel market is due largely to abnormal conditions, including the loss of 18 million tons of production due to strikes since the end of the war, according to Walter S. Tower, president, American Iron & Steel Institute.

Mr. Tower pointed out that steel company executives themselves have been more concerned, perhaps, than any other

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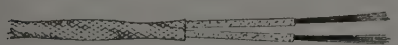

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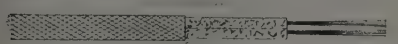

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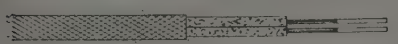
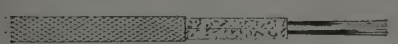


•CHROMEL-ALUMEL, Cat. No. 1234, 14 ga., SOLID-DUPLEX, each wire enamel, felted asbestos, Asbestos-yarn braid overall.



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group with the problem of postwar steel supply and demand and have been lending every effort to bring about a better balance.

To this end, Mr. Tower said, the industry by the end of this year will have spent about $1 billion in postwar modernization and expansion.

Among abnormal conditions contributing to the steel shortage, Mr. Tower listed the following:

1. Since the end of the war there have been two concurrent kinds of demand for steel—one to supply the unprecedented demand for goods caused by the sharp curtailment of civilian production during the war, and the other to fill up war-depleted inventories. Obviously the second kind of demand has been unusual and will taper off when normal inventories are restored.

2. In the 24 months since the fall of Japan, the steel industry has lost 18 million tons of steel ingots through strikes in steel and coal.

3. Strikes and delays in industries supplying machinery for the steel industry have hampered improvements and expansion plans in the industry.

Steel company shipments for export this year have amounted to about 7 per cent of total shipment, Mr. Tower said. This is no greater percentage than in prewar years. A substantial amount of steel exported has been in accordance with government directives.

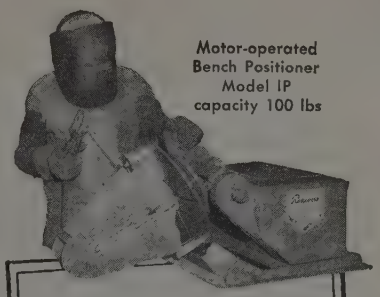
During the first eight months of 1947, ingot production totaled 56 million tons, or an annual rate of 85 million tons, the highest of any peacetime year and 60 per cent above 1939 output.

There was a 79 per cent increase this year in the production of flat-rolled products, used by makers of automobiles, refrigerators and similar products.

"Throughout all its peacetime history, the modern steel industry of the United States has maintained a productive capacity well ahead of demand. Operations of the industry in the more than 20 years elapsing between the two world wars averaged 61 per cent of capacity."

He pointed out that capacity of 91,241,000 tons of ingots has increased 46 per cent between the two wars, as compared with a 35 per cent increase in population.

"In the past the industry has been accused of overexpansion but never before in peacetime has it been accused of underexpansion," he said. "As late as 1940 prominent labor leaders, government economists, members of the Temporary National Economic Committee and others were complaining that the steel industry was contributing dangerously to technological unemployment through excessive modernization of equipment. Testimony to this effect was presented before the TNEC in April, 1940."



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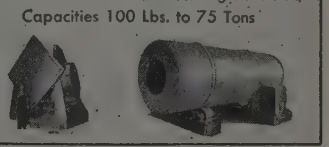

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Restyling Trends for 1948 Automobiles Summarized

(*Continued from Page 76*)

competitive battle with Cadillac, Chrysler and the large Buicks, despite the fact it is somewhat out of line pricewise with the latter two. Introduction of 1948 models will be in advance of Ford and Mercury, maybe around February.

MERCURY

As with Ford and Lincoln, a comprehensive restyling of bodies and chassis has been effected for 1948 models which should be made public ahead of the 1948 Ford, barring unforeseen delays early next year. The effort has been made to work out a distinctly different appearance from Ford and to tie Mercury more closely to Lincoln than to Ford, with the idea of intensifying competition with the Olds-Pontiac-Dodge-DeSoto price class. When the Ford automatic transmission reaches the production stage, it may be offered first on Lincoln and Mercury, where the cost angle is not so critical.

NASH

Since most of this company's planning centralizes around Kenosha and Racine, Wis., Detroit is not in too close touch with current developments. However, it is understood Nash is ready with its 1948 model setup and might even break the news before year-end, to get a competitive jump, particularly if Hudson should pop in the next couple of months. The 600 model should feature only minor restyling of body lines and trim, while mechanical features may be led by larger and better-sealed brakes, along with a larger clutch. The Ambassador series could logically be expected to move in the direction of eliminating the conventional frame in favor of the "unisteel" construction used on the 600.

OLDSMOBILE

Next year will be the division's fiftieth anniversary model, doubtless using the same basic type of body as that developed for Cadillac and Buick. A changeover early next year would not be surprising. Reports have been heard of plans to use the present Cadillac V-8 engine, or a reasonably exact facsimile, in at least one Olds model next year. Tests are under way on a V-8 engine, considerably beefed up for much higher compression ratio, but it could hardly be ready for production before 1950.

PACKARD

Already in production in convertible models, the 1948 line of this producer will be extended to cover closed body types within the next few months. Briggs Mfg. Co. has set up a former aircraft parts plant for exclusive use on Packard body operation. Stumbling block in the way of an earlier changeover has been lack of steel which prevented running out 1947 schedules as planned. Six-cylinder engine has been abandoned, except for taxicabs and replacement, and the 1948 models will offer three lines of 8-cylinder engines, one entirely new and currently being installed in what few 1948 convertibles can be assembled. A new and larger convertible model is due for announcement this fall. An infinitely-variable type of automatic transmission has been under development for some time and was scheduled for the 1948 models, although recurrent engineering problems now make this problematical.

PLYMOUTH

Situation here is much the same as with the rest of the Chrysler line and apparently no major model change is in the offing. When the present series was introduced it was not identified as a 1947 model but merely as "the next" model, so presumably it will be continued, with perhaps minor modifications and relocation of "glitter" until a new tooling program can be consummated. Competitive pressure from Ford and Chevrolet conceivably might accelerate such a program, although car builders do not worry much about competition now.

PONTIAC

Tools and dies for the 1949 models have been started through Fisher Body shops, much as is the case with Chevrolet, indicating 1948 models will involve nothing much beyond new grilles and other decorative alterations. Whether this applies to the larger Pontiac 8-cylinder models as well is not too clear, since in the past new body types developed for Olds and Buick have been extended to Pontiac. Company officials have been quoted as saying there would be nothing radically new for 1948, so it may be that Pontiac is being tied more closely to Chevrolet than to Buick and Olds as far as bodies go. An automatic transmission is planned for early introduction, to be manufactured either by Buick or by GM's Detroit Transmission division, the latter according to first reports. Principal emphasis in the past year has been upon extending manufacturing facilities for higher production, rather than new model planning.

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bon copies of course, but the same general trend: Bodies wider with integral fenders; floor level lower with seats "cradled" between the wheels; and better vision by extending rear glass around quarter panels to eliminate blind spots. Although the larger manufacturers will not admit it publicly, the universal trend is in the direction pioneered by Studebaker and to a certain extent by Kaiser-Frazer. Thus it is almost a certainty Studebaker will have nothing particularly different for 1948, beyond the introduction of some new body types around the present basic design. An automatic transmission will come along when development work has been proved and tested. No particular pressure exists for hurrying this activity. An extensive realignment of executive and manufacturing personnel brings in a number of younger men to top posts and could result in a new zip to production.

TUCKER

Still strictly in the embryonic stage, the Tucker '48 is unquestionably the most radical passenger car design yet to appear, despite the fact it has been toned down considerably from its original conception. One hand-built model has been completed for exhibition purposes, and crews are at work on about 25 more of the same. Production is still a long way off and this question can logically be asked: If Kaiser-Frazer required $54 million in stock plus an additional $12 million in loans to get into profitable production on a standard type of car, how can Tucker expect to build a radically-styled model with less than $15 million from his stock issue? He does have additional funds from advances furnished by prospective dealers, but his outlook under today's costs and materials problems is, to say the least, precarious. Unusual type of engine proposed for the Tucker—a horizontal-opposed 6-cylinder aluminum block with blind bores and aluminum bronze sprayed cylinder walls—alone would appear to require exensive testing before it could be approved for dependable operation.

WILLYS-OVERLAND

Last models from this producer are the two-wheel and four-wheel drive truck series. Meanwhile engineering talent is concentrating on a proposed 6-cylinder passenger car, originally planned for appearance last May but now only a possibility for next year. The car, as inspected in mockup form some months ago, is a standard type of small sedan, emphasizing utility, with no radical innovations in design other than the suspension system. Doubtless many changes have been worked out since that time. Actual introduction may await a tapering in demand for jeeps and jeep station wagons.

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1620 tons, 12-story East River apartments, Grand and Willets Sts., New York, to Harris Structural Steel Co., New York.

1300 tons, school No. 22, Bronx, N. Y., to Harris Structural Steel Co., New York.

1200 tons, spring plant building, Wallace Barnes Co., Division of Associated Spring Corp., Forestville, Conn., to Berlin Construction Co., Berlin, Conn.; Turner Construction Co., Boston, general contractor.

1180 tons, plant addition, Wallace Barnes Co., Forestville, Conn., to Bethlehem Steel Co., Bethlehem, Pa.

900 tons, canning factory, Continental Can Co., Portland, Oreg., to Bethlehem Steel Co., Bethlehem, Pa.

655 tons, building, Star-Telegram, Fort Worth, Tex., to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, beam span, El Paso, Tex., for State Highway Commission, to Petroleum Iron Works Div., Pennsylvania Shipyards Inc., Beaumont, Tex.

500 tons, acid plant, Swift & Co., Agricola, Fla., to Steel Construction Co., Birmingham, Ala.

390 tons, addition, Sacred Heart of Marry School, New York, to Schacht Steel Construction Inc., New York City.

345 tons, laboratory, Johns-Manville Co., Manville, N. J., to Harris Structural Steel Co., New York.

320 tons, telephone building, Far Rockaway, New York, to Drier Iron Works, Long Island City, N. Y.

310 tons, Jewish Center, Rego Park, Long Island, to Bethlehem Steel Co., Bethlehem, Pa.

360 tons, building, Rork Mfg. Co., North Bergen, N. J., to Bergen Iron & Steel Co., Carlstadt, N. J.

300 tons, paint warehouse, John Lucas Co., Gibbsboro, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, addition, public school No. 131, Jamaica, L. I., New York, to Harris Structural Steel Co., New York.

300 tons, building, Pittsburgh Plate Glass Co., St. Louis, to Mississippi Valley Structural Steel Co., Decatur, Ill.; Woermann Construction Co., St. Louis, contractor.

285 tons, addition, Stegmaier Brewery, Wilkes-Barre, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

260 tons, building, Parts Mfg. Co., North Bergen, N. J., to Oltmer Iron Works, Jersey City, N. J.

260 tons, state bridge, northern New Jersey, through the Union Building & Construction Co., to Bethlehem Steel Co., Bethlehem, Pa.

250 tons, state bridge work, Middlesex and Union counties, New Jersey, through the Villa Construction Co., to Bethlehem Steel Co., Bethlehem, Pa.

235 tons, state bridge over Lehigh Valley railroad, Route 25, Northern New Jersey, to Harris Structural Steel Co., New York.

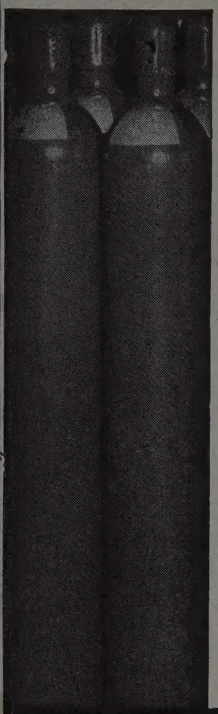
232 tons, addition to armory, Minnesota National Guard, St. Paul, to St. Paul Foundry & Mfg. Co., St. Paul.

190 tons, 35 transmission towers, Rockland Light & Power Co., Haverstraw, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

185 tons, corrugated box plant addition, Maspeth, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, factory, addition for a propeller company, East Hartford, Conn., to R. C. Mahon Co., Detroit.

155 tons, plant addition, Barrett Division, American Chemical & Dye Corp., Ironton, O., to Ingalls Iron Works, Birmingham, Ala.



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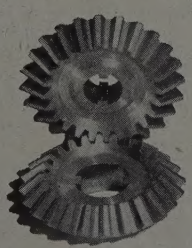

HELICAL and BEVEL GEARS—From 1" to 60" in diameter and from 24 DP to 1½ DP.
SPUR GEARS—Size range from ¾" to 150" in diameter. 32 DP to ¾ DP.
HERRINGBONE GEARS—Made from 1" to 60" in diameter and from 10 DP to 1½ DP.
SPIRAL BEVEL GEARS—Made from 1" to 30" in diam. and 24 DP to 1½ DP.
WORM GEARS—Made from 1" to 100" in diam. and from 24 DP to 1 DP.

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MAGNESIUM – 8.37%
BRASS – 8.37%
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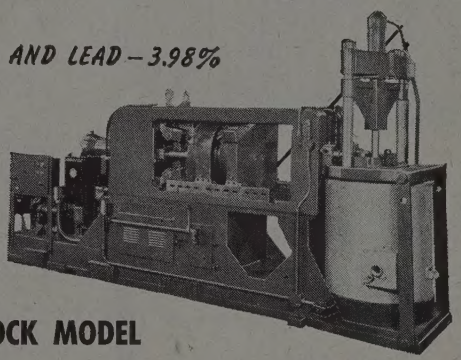

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* Figures compiled by STEEL magazine showing percentage of plants diecasting various metals in 1946.

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CLEVELAND, OHIO

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

FRESNO, CALIF.—Grinnel Co. of the Pacific plans to build a $100,000 warehouse here at Hamilton and East Aves.

FULLERTON, CALIF.—John W. Potts Inc. has been formed by John W. Potts and associates to manufacture and sell steel windows and doors and other building materials. Firm is represented by Dorothy Thompson Lodge, 306 Chapman Bldg.

LOS ANGELES—Associated Piping & Engineering Co., 1373 E. Compton Blvd., plans to build a $70,000 factory.

LOS ANGELES—Southern California Metal Spinning Co. Inc. has been formed with 20,000 shares of no par value capital stock by Leonard De Bell and associates. Firm is represented by William K. Young, 810 S. Spring St.

LOS ANGELES—Pacific Steel Belt Conveyor Co. has been incorporated with 2500 shares of no par value stock by Roy Gast and associates. Firm is represented by Stewart, Shaw & Murphy, 835 Rowan Bldg.

OAKLAND, CALIF. — Marchant Calculating Machine Co. has started construction of a $350,000 addition to its main plant here. Facilities, expected to be in operation early next year, will increase productive capacity by 100 per cent.

RICHMOND, CALIF.—Pacific Telephone & Telegraph Co., 2105 MacDonald Ave., has awarded a $510,000 contract to E. J. Freethy, 1432 Kearney St., El Cerrito, for construction of a 2-story addition to its building here. Structure was designed by company's engineers.

SAN DIEGO, CALIF.—Hydra-Products Inc. has been formed by Gordon W. Hardy and associates with a capital of $200,000 to manufacture and construct machines. Firm is represented by Cory & Schwartz, San Diego Trust & Savings Bldg.

VERNON, CALIF.—Pacific Pumps Inc., 5714 Bickell St., Huntington Park, plans to build a $110,000 addition to its machine shop. Consulting engineer is W. M. Bostock, 8414 Otis St., South Gate.

WILMINGTON, CALIF.—Joshua Hendy Corp. has awarded a $125,000 contract to Bechtel Corp., 3780 Wilshire Blvd., Los Angeles, for construction of a warehouse building on Dock St.

FLORIDA

CARRABELLE, FLA.—Grier A. Quay and John Blosco, East Palestine, O., have plans in progress for converting the recently purchased Camp Gordon Johnston on St. James Island near here into a mulitple-industry unit.

MICHIGAN

DEARBORN, MICH.—Kasle Steel Corp., 6782 Goldsmith St., plans to build a $100,000 building for a steel pickling plant and warehouse. Architect is J. C. Laursen, 18282 Patton St., Detroit.

GRAND RAPIDS, MICH. — Nash-Kelvinator Corp. has awarded a $220,000 contract to American Liquid Gas Corp., 2740 Book Bldg., Detroit, for the construction of a gas manufacturing plant.

MORTON GROVE, ILL.—H. M. Harper Co., 2620 W. Fletcher St., Chicago, will build a $1 million manufacturing plant and office here at Oakton St. and Lehigh Rd. To have 138,000 sq ft of floor space, the facility was designed by Arthur M. Heda, Chicago. General contractor is J. Emil Anderson & Son, 1811 W. Balmoral Ave., Chicago.

TRENTON, MICH.—Monsanto Chemical Co. has awarded a $250,000 contract to Kuhne and Simons Construction Co., 1048 Penobscot Bldg., Detroit, for the erection of a machine shop and storage building.

NEW YORK

FOWLER, N. Y.—R. T. Vanderbilt Co. Inc., New York, has awarded a contract to James Stewart & Co. Inc. for the construction of a mill designed to produce 250 tons of talc daily. Talc is used for paint, talcum powder and cosmetics, ceramics, rubber and paper.

LONG ISLAND CITY, N. Y.—Cushman's Sons Inc., 250 W. 57th St., New York, plans to build a 3-story factory here on Northern Blvd. near 48th St. Plans are by R. Henderson, c/o owner.

SYRACUSE, N. Y.—L. C. Smith & Corona Typewriters Inc. is building a plant addition which will increase its floor space by 50 per cent.

PENNSYLVANIA

ENOLA, PA. — Pennsylvania Railroad has awarded a $319,000 contract to Ritter Bros., 1511 N. Cameron St., Philadelphia, for the construction of a diesel engine shop here.

HARMARVILLE, PA.—Gulf Research & Development Co., Gulf Bldg., Pittsburgh, has awarded a $201,000 contract to George A. Seaman & Co., 5145 Liberty Ave., Pittsburgh, for the construction of two research laboratories.

MIDLAND, PA.—Crucible Steel Co., Oliver Bldg., Pittsburgh, has awarded a $6 million contract to Koppers Co. Inc., Pittsburgh, for the construction of coke and byproduct facilities.

PITTSBURGH—Jones & Laughlin Steel Corp. has awarded $4 million contract to Rust Engineering Co. for a boiler house at its South Side plant. Facility will replace several boiler installations now in operation.

VESTABURG, PA.—Jones & Laughlin Steel Corp., Third and Ross Sts., Pittsburgh, has awarded a $7 million contract to F. H. McGraw Co., First National Bank Bldg., Pittsburgh, for the design and construction of a coal washer plant.

VIRGINIA

ROANOKE, VA.—Appalachian Electric Power Co., 611 Jefferson St., plans to build a $1,500,000 garage and office building.

WISCONSIN

LA CROSSE, WIS. — LaCrosse Telephone Corp., Fifth and Jay Sts., has awarded a $110,000 contract to T. J. Molzahn & Sons Inc., 1812 Madison St., for construction of a 2-story warehouse, garage and office building.

MILWAUKEE—International Harvester Co., 180 N. Michigan Ave., Chicago, has let a $350,000 contract to Permanent Construction Co., 4100 N. Third St., for construction of a truck service plant.

PT. WASHINGTON, WIS.—Simplicity Mfg. Co., 326 Spring St., has awarded a contract to T. H. Bentley & Son Inc., 4610 W. Mitchell St., Milwaukee, for construction of a factory and garage.

TWO RIVERS, WIS.—Aluminum Goods Mfg. Co., 1509 16th St., plans to build a 3-story warehouse. Engineer is W. Fred Doike, 189 W. Madison St., Chicago.

CANADA

MONCTON, N. B.—Terminal Construction Co. Ltd. will build an asphalt plant.

TORONTO, ONT.—F. Haughton & Co. of Canada Ltd., 165 Dufferin St., has awarded a $200,000 contract to Graham & Sibbett Ltd., 388 Yonge St., for the construction of a 3-story factory and office on Symes Ave. W.

TORONTO, ONT.—National Cash Register of Canada Ltd., 222 Lansdowne Ave., has awarded a $200,000 contract to Jackson-Lewis Construction Co. Ltd., 80 King St. W., for the erection of a 1-story plant. Engineers are Morrison, Hershfield, Millmara & Huggins, 96 Bloor St. W.

MONTREAL, QUE.—Fry-Cadbury Ltd., 2025 Masson St., plans to build an $85,000 factory addition. Engineer is G. D. Thompson, 1241 Guy St.